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Lead-user identification, involvement and motivation in business-to-business context

Master's Thesis

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Aalto University School of Science Degree Programme in Information Networks		ABSTRACT OF THE MASTER'S THESIS
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Abstract: The research studies different identification, involvement, and motivation methods and practices for lead users to be incorporated in firms' product and service development processes. The research questions are: 1) How to identify lead users in the field of flexible and collaborative work, and 2) How to best involve and motivate lead users in the product development process of both consulting services and software development in the field of flexible and collaborative work.

The empirical research was conducted with a novel approach called Mountaineering, where a number of methods are used sequentially in order to reach the most leading-edge users. The context of flexible and collaborative work was different from all previous lead user studies in a sense that none of those have been conducted in a field of social innovations, but in very technical domains.

In total 22 user interviews were conducted with users from Finland, the United States and the United Kingdom, and another 137 leads in the identification process were a part of the research. Out of the 22 interviewed users, 11 were identified as lead users. The lead users were found to be well connected to one another even across country borders. A network analysis about the interconnectedness of all leads used in the research showed how users viewed the same users to be knowledgeable within the topic of research, i.e. flexible and collaborative work. All interviewed users shared a view towards an increase in knowledge work and therefore the need to accommodate to people's wishes to work in more flexible terms.

A number of best practices for the involvement and motivation of lead users were also provided. Those were for example organizing and carefully planning a workshop where users engage in participatory design methods and conceptualize new product ideas, putting an interdisciplinary team in charge of the project and aligning incentives with them, and giving users recognition and a sense of ownership of the product being developed. Also, communicating about the involvement process externally in e.g. a company blog was proposed to increase the company's brand as a leading-edge innovator in the field.

Keywords: lead user, user innovation, user involvement, user motivation, flexible and collaborative work

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Tiivistelmä: Tutkimuksen aiheena ovat eri menetelmät edelläkäyttäjien tunnistamiseen sekä eri osallistamis- ja motivointimenetelmät, joilla voidaan varmistaa edelläkäyttäjien osallistuminen yritysten tuote-ja palvelukehitysprosesseihin. Tutkimuskysymykset ovat: 1) kuinka tunnistaa edelläkäyttäjiä joustavan ja yhteistoiminnallisen työn kontekstissa ja 2) kuinka parhaiten osallistaa ja motivoida edelläkäyttäjiä sekä konsultointipalveluiden että ohjelmistokehityksen tuote- ja palvelukehitysprosesseihin joustavan ja yhteistoiminnallisen työn kontekstissa.

Työn empirinen osuus toteutettiin uutta edelläkäyttäjien tunnistamismenetelmää ”Mountaineering”:ia hyödyntäen. Menetelmässä tutkija käyttää eri tunnistamismenetelmiä vuorotellen löytääkseen käyttäjät, jotka ovat muihin verrattuna edelläkävijöitä. Joustavan ja yhteistoiminnallisen työn konteksti poikkeaa kaikista aiemmin tehdyistä edelläkäyttäjätutkimuksista, sillä aiemmat tutkimukset on toteutettu teknisissä ympäristöissä, kun taas tutkimuksen konteksti käsittelee sosiaalisia innovaatioita.

Kaikkiaan 22 käyttäjää haastateltiin. Tutkimuksessa oli mukana käyttäjiä Suomesta, Yhdysvalloista ja Iso-Britanniasta. 137 muuta tutkimuskohdetta kuten käyttäjää, organisaatiota tai tapahtumaa oli myös osana tutkimusta. 22 haastatellusta käyttäjästä 11 todettiin olevan edelläkäyttäjiä. Edelläkäyttäjien todettiin olevan hyvin verkottuneita keskenään jopa maiden rajat ylittäen. Tutkimuskohteille tehty verkostoanalyysi osoitti samojen käyttäjien olevan toisten käyttäjien mielestä asiantuntevia tutkimusaiheesta, eli joustavasta ja yhteistoiminnallisesta työstä. Kaikki haastatellut käyttäjät olivat sitä mieltä, että tietotyön yleistyminen johtaa myös joustavien työtapojen yleistymiseen.

Tutkimuksessa ehdotettiin parhaita käytäntöjä yrityksille, jotka haluavat osallistaa ja motivoida edelläkäyttäjiä tuote- ja palvelukehitysprosesseihinsa. Näitä ovat esimerkiksi edelläkäyttäjätyöpajan järjestäminen ja huolellinen suunnittelu: työpajassa on tarkoitus konseptoida uusia ideoita ja käyttää tähän erilaisia osallistavan suunnittelun menetelmiä. Edelläkäyttäjähankkeen vetäjäksi suositellaan poikkitieteellistä tiimiä, jonka insentiivien on oltava linjassa projektin tavoitteiden kanssa. Työpajaan osallistuvia käyttäjiä suositellaan kiitettävän julkisesti ja hankkeen vetäjien on varmistettava, että edelläkäyttäjille muodostuu tunne osavastuullisuudesta tuotteen kehityksessä. Tutkimus ehdottaa, että osallistamisprosessista viestiminen esimerkiksi yritysblogin kautta rakentaa mielikuvaa ja brändiä yrityksestä edelläkävijänä ja alan innovoijana.

Avainsanat: edelläkäyttäjä, käyttäjäinnovaatio, käyttäjän osallistaminen, käyttäjän motivointi, joustava ja yhteistoiminnallinen työ

Preface

Finishing my thesis has not only been my own effort, but I have been accompanied by an extended team of experts, coaches and supporters always willing to help me forward.

I am grateful for the opportunity Rapal Oy provided me by letting me concentrate on my thesis and offer me all the support and networks needed. Thank you Joakim Gunst, my instructor at Rapal Oy for sharing your knowledge and your thoughtful and specific comments. I would also like to thank Jari Turunen for both making this thesis possible, and enabling me to continue the conversation with all lead users found through this research.

Thank you to my instructors Pia Helminen and Samuli Mäkinen for being so open and clear in your guidance, working with you was very enjoyable and I am truly grateful for that.

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Thank you to my father Tapio for lobbying for an education in engineering, without you I wouldn't be where I am today. Thank you to my mother Helena for your encouragement and support. I also want to thank my aunt Eppu and my sisters Hanna and Maria for being there for me.

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In Espoo, November 7, 2013

Saara Tuomela

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1 Introduction

1.1 Motivation for the research

Today, more and more commercially successful products are increasingly based not on the manufacturer's innovation, but the user's. Fields such as outdoor consumer products, medical surgery equipment and extreme sporting equipment have shown significant emergence of innovation by users – researchers have reported that over 30% of innovations are invented by users in these fields (e.g. Lüthje and Herstatt, 2004; Lüthje, 2004; Schreier and Prügl, 2008). Many studies have attempted to find out whether there are any systematic differences between users who innovate and those that do not (Schreier and Prügl, 2008). Research about lead users has tried to explain the emergence of user innovations by defining lead users as users of a product or service that face needs that will become general in the marketplace, but face them much earlier than the majority of users do (von Hippel, 1986). It has been suggested that lead users be integrated into the product development and innovation processes of firms (e.g. Enkel et al., 2005; Schreier et al., 2007; Urban and Hippel, 1988; von Hippel, 1986)

However, it is often not trivial to identify who these lead users are, and how to assess the characteristics that define a leading-edge position relating to a trend (Lüthje and Herstatt, 2004). Another big challenge regarding the involvement of lead users is their motivation: especially in the business-to-business (B2B) market space, lead users should expect significant benefits from cooperating with their supplier's product development in order to be fully motivated. Rapidly changing fields such as high technology place additional strains on determining user needs for new products. For such industries, finding lead users who have real-life experience with novel product or process needs is a necessity in order to meet changing customer needs (von Hippel, 1988).

1.2 Scope and research questions

In this thesis, the lead-user method (von Hippel, 1988) that is widely recognized in different technological domains and the adoption of technological innovations is expanded, and its appropriateness is evaluated within the field of social innovations. In this thesis, the term social innovation refers to novel ideas that work in meeting social goals (Mulgan et al., 2007). The term has very wide boundaries, and it has been discussed whether for-profit organizations can actually develop social innovations or not (ibid.). Mulgan et al. (2007) differentiate among companies that generate new practices in order to maximize profits and those that are motivated

more by the well-being of workers, which can be seen as a social goal. The differentiation among these two viewpoints is very hard to make, but in this thesis, novel practices in the context of flexible and collaborative work are regarded as social innovations. In this thesis, flexible and collaborative work are defined as the following:

- Flexible work includes "working arrangements which allow employees to vary the amount, timing or location of their work" (de Menezes and Kelliher, 2011 p. 453)
- Collaborative work involves shared tasks with team members in order to meet mutual goals (Churchill and Snowdon, 1998)

As a result of the literature review and the empirical findings of the thesis, the lead-user identification process is evaluated and lead users relating to the trends recognized are found. Understanding the needs of lead users is a mutual challenge regarding both people facing the customers (e.g. salespeople) and people involved in product development. Therefore, the strategic importance of lead users is very high and this thesis seeks to answer a two-fold research question regarding these users:

1) How to identify lead users in the field of flexible and collaborative work, and
2) How to best involve and motivate lead users in the product development process of both consulting services and software development in the field of flexible and collaborative work.

The first research question is addressed by first studying existing literature about lead users as well as getting acquainted with different cases and previous success stories of how to identify lead users. The empirical part of the study will concentrate on identifying lead users for the development of a novel product concept in the context of flexible and collaborative work.

The second question will be answered based on literature. A number of suggestions on how to best involve and motivate lead users to take part in product development will be provided based on literature and the empirical findings of the research. The context of the empirical case is related to a potential new product release at Rapal Oy, a Finnish software company specializing in the built environment.

2 Literature review

2.1 Users in product development

User involvement in product development is generally recognized to increase usability and thereby the success of the end product in the target market (Damodaran, 1996; Jokela et al., 2003; Kujala, 2003). Usability is defined as "the capability in human functional terms to be used easily and effectively by the specified range of users, given specified training and user support, to fulfill the specified range of tasks, within the specified range of environmental scenarios" (Shackel and Richardson, 1991 p. 24). Another important reason for user involvement is the fact that users will be the ones determining whether the service or product meets their needs or not, and therefore users should be regarded as valuable sources for new ideas (Kristensson et al., 2004). The company incorporating its users' perspective will benefit from the investment in terms of both reduced costs and increased sales (Rohn, 2005). The company saves both time and money as the probability of having to make major changes to the product decreases (ibid.). Users prefer more usable products and services, which results in increased sales and lower support costs (ibid.). Customers also benefit from having a both useful and usable product or service, which requires less training, and increases productivity (ibid.). For business-to-business (B2B) companies, the effects can multiply, as usability affects all parties involved: the vendor, the direct customer, the customer's internal users and their customers etc. (ibid.). This reasoning clearly suggests how even a small improvement in usability, often reached by involving customers, is viable both from an economic point of view as well as from the perspective of improved customer satisfaction (ibid., Voss et al., 2009).

There are three general approaches to include users in the design process: *user-centered design*, *participatory design*, and *user innovation*. The orientations differ in the level of incorporating the user in the actual design process: the timing, scale, and purpose of user engagement (Voss et al., 2009). *User-centered design*, often also called human-centered design or usability engineering, is a practice where users are actively involved in the design process so that user and task requirements are clearly understood (Jokela et al., 2003). Design solutions are iterated and designed multi-disciplinarily (i.e. relating to multiple areas of study) and functions are allocated appropriately between users and technology (Jokela et al., 2003). This means that the design team tries to identify and understand customer needs and develop the design based on these. It is generally agreed that usability increases through the involvement of users in the developed system's design (Karat, 1997).

However, there is still much controversy about what the difference between the methods to involve users is. Also, the stage in which users should be involved in the product development process is another topic causing debate (e.g. Enkel et al., 2005).

The second general orientation, called *participatory design*, first emerged in the 1970 as a means to align the goals of academics and people from trade unions. Participatory methods such as future workshops and prototyping were used in order to solve value conflicts between those seeing technology as an option for profit maximization and those concentrating more on the perspectives of workers (Muller and Kuhn, 1993). Schuler and Namioka (1993, p. xi) define participatory design practices in the following way: "the people destined to *use* the system play a critical role in *designing* it". The core idea is that instead of always analyzing the impacts of technology on people, one should investigate the impact of people on technology (Muller and Kuhn, 1993). In this approach users are regarded as experts who know best how to improve their work and their work life, hence reversing traditional designer-user roles (Schuler and Namioka, 1993). This approach sees the design process as an interactive one, where users work alongside designers so that the users' needs become clear to the designers (Schuler and Namioka, 1993 pp. 10-11).

The third approach, *user innovation*, differs from the two previously presented ones in a sense that the user innovates with or without the designer (Helminen, 2012). The innovation is realized specifically by the user (ibid.), and manufacturers may or may not be responsible for the commercialization of products (Shah and Tripsas, 2012).

Users have often been a source of new innovations and product ideas, as has been the case in e.g. mountain biking, and in developing tools for surgeons (Schreier et al., 2007; von Hippel, 1988). Innovating users have been studied and it has been found that these have several similar characteristics, often recognized to be lead-user characteristics (von Hippel, 2005). Identifying users that innovate, however, is not trivial, and research in the area has tried to rationalize the process of finding such rare users (Churchill et al., 2009; Mäkinen et al., 2013). Among these innovative users are lead users, which are users that face needs that will become general in the marketplace much earlier than the majority of all users, and expect high benefits from developing a solution to those needs (von Hippel, 1988, 1986). Many attempts to identify lead users have been characterized to be very laborious, because relevant users are so few and apart (Churchill et al., 2009; Mäkinen et al., 2013; Olson and Bakke, 2001). Also, researchers have attempted to compare different identification methods in order to find the most effective ones for identifying lead users (Mäkinen et al., 2013; Stockstrom et al., 2012; von Hippel et al., 2009).

2.1.1 Involvement of users

The majority of studies about user involvement assume that involving users in the new product and service development process is beneficial for the company (e.g. Bitner and Brown, 2008; Carbonell et al., 2012). However, it is important for the firm willing to incorporate users in their product development to make conscious choices about which users to involve; which users are the ones with relevant development ideas (e.g. Carbonell et al., 2012; Poetz and Schreier, 2012). This is where lead users have been suggested to be useful: the important difference between lead users and average users is the fact that lead users, as opposed to average users, come up with attractive innovations (Schreier and Prügl, 2008).

Involving the right users has become a prominent discussion topic also with the introduction of crowdsourcing, i.e. outsourcing idea generation to an external crowd of users, a practice that has gained popularity in recent years. In Schreier and Prügl's (2012) research in the consumer goods market for baby products, the authors conclude that attracting the right kind of people into the crowdsourcing efforts is crucial. Not only does including leading-edge or lead users increase the average quality of ideas submitted, but also the average quality of the best ideas (Poetz and Schreier, 2012).

The trouble related to user involvement is the lack of clarity in the actual ways to involve customers or users in the company's processes. This section will provide an outlook on literature about user involvement and the best practices about how to actually involve users. The involvement of lead users will be studied in section 2.5.

2.1.2 About user involvement

Companies today are more and more concerned about providing users with products and services that meet their needs better than competitors' solutions. This has led to an increasing interest towards market orientation, so that companies can better understand users' needs (e.g. Kristensson et al., 2008; Marketing Science Institute, 2012; Narver et al., 2004). Especially for technology-based service companies, ascertaining the needs of users is difficult as most users have limited technological knowledge and therefore find it hard to articulate their ideas about what would create surplus value for them (Kristensson et al., 2008). The reasoning behind the involvement of users into the new product development processes of companies is that if users are the persons who decide whether or not a product idea represents a unique way of meeting their needs, then users should be regarded as a valuable source to initiate new ideas (Kristensson et al., 2004). In the field of agile software development, the input of users is seen as a starting point: before designing

or prototyping anything, interaction designers have the responsibility of gathering customer data for analysis (Miller, 2005; Sy, 2007).

A number of papers have introduced cases where users were incorporated into the innovation or product development processes of companies. However, this literature is scattered and there is no consensus on how knowledge is created and learning achieved with real or potential users and then transferred within the organization (Matthing et al., 2004). In some articles, involvement is regarded as full-on participation into the product or service development process, and in others, involvement only means providing ideas for future implementation (e.g. Barki and Hartwick, 1989; Ives and Olson, 1984; Kristensson et al., 2008). Most of this research differentiates between the stages, i.e. the timing of user involvement, but there is no consensus about not only the product development process, but also the stage in which users should be involved.

2.1.2.1 Timing of involvement

Pitta and Franzak (1997) discuss how users should be involved throughout the product development process, but especially in the idea generation phase and from product development onwards. They do not however specify the steps in the product development process before or after these two steps. (Pitta and Franzak, 1997)

Kaulio (1998) differentiates among five stages in the product development process and states that there are three most frequently used interaction points with the consumer. Those are specification, concept development and prototyping, which can be seen as rather traditional stages to take user information into account. (Kaulio, 1998)

Gruner and Holmburg (2000) state that user interaction during early and late stages in the product development process can increase new product success. Interaction efforts in the medium stages do not have an effect on the end product's success and therefore are not recommended. (Gruner and Homburg, 2000)

Alam (2002) presents a 10-stage model for product development and states that user involvement is especially relevant in three stages: idea generation, service and process design, and service testing and pilot run. These stages represent the ones after which substantial alterations would become difficult to implement, and therefore early involvement and follow-ups are important. Involving users through the whole cycle is a way to build lasting relationships with them, which leads to better quality of services and products and satisfied users. (Alam, 2002)

Kok et al. (2003) characterize the product development process in seven steps, and state that market-oriented product development requires not only market information, but also cognitive elements such as knowledge and skills in order to succeed. This means that market information has to be melded with e.g. knowledge about technical restrictions and regulations. According to the writers, the idea generation stage requires studying of the markets to be entered, whereas in the concept stage specific input about user requirements is needed. In the testing stage, users participate in the evaluation of the developed prototypes under real-life circumstances. Part of the logic of why users are not thoroughly involved in the earliest stages of product development is the cost factor: the product's technical and commercial feasibility need to be assessed before substantial amounts of money is committed to the development project. In later stages, market information guides decision-making about product concepts, prototypes and launch strategies. (Kok et al., 2003)

Brockhoff (2003) characterizes the product development process as one with six stages, and proposes that different kinds of user contributions would be useful in different steps. Figure 1 summarizes the nature of user contributions to each step of the process. (Brockhoff, 2003)

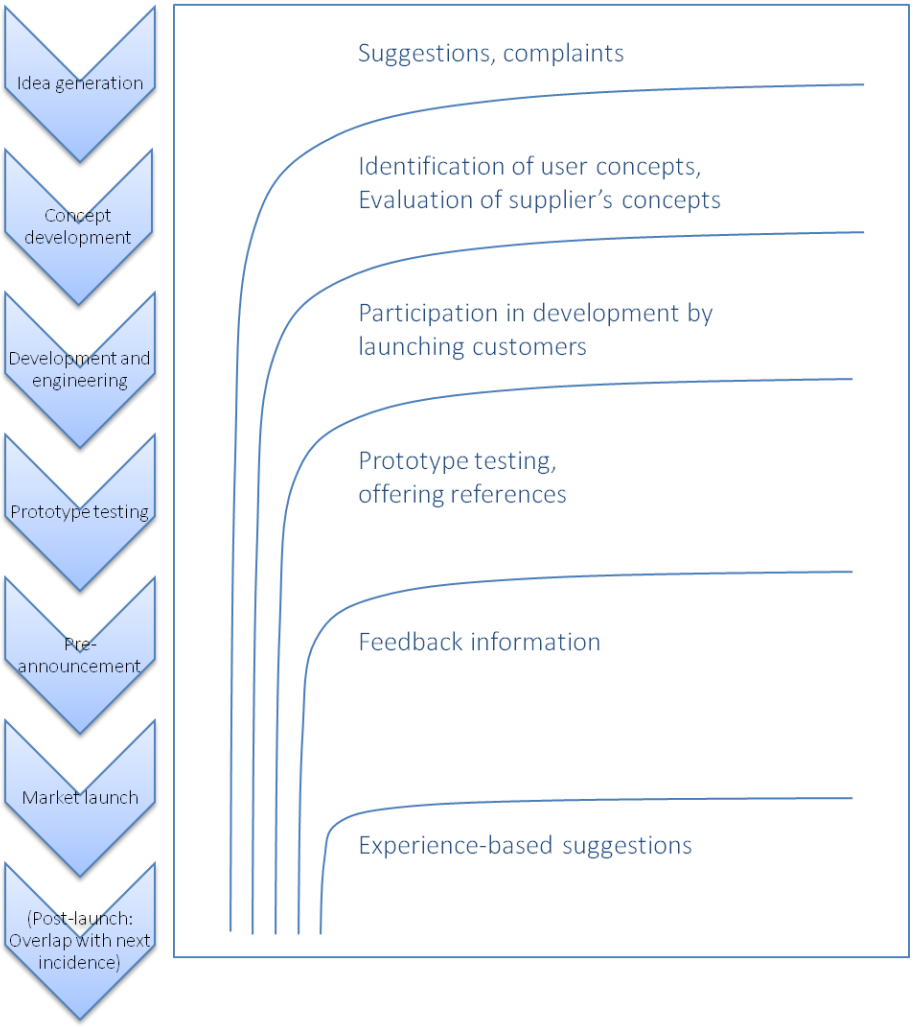

Figure 1 - Stages of product development and user contributions (Brockhoff, 2003)

Magnusson et al. (2003) study the innovative capability of users in the early phases of ideation and concept development. Outside of this notion, their research does not differentiate among more product development stages. Also, they do not comment involvement efforts for later stages than those stated. (Magnusson et al., 2003)

Similarly to Pitta and Franzak (1997) and Magnusson et al. (2003), Matthing et al. (2004) study user involvement in a specific product development stage, but do not provide insights of the kind of product development process they followed. Matthing et al. (2004) propose that users should be involved early and intensively in the process, as in their case where user toolkits were studied.

Enkel et al. (2005) took Brockhoff's framework further (see Figure 2) by suggesting different types of users to be best for different stages in the process. Lead users could be integrated in all stages of the process, but the degree of involvement is determined by the benefits to be obtained. It should be noted that the same user

does not represent the lead user in all stages of the process. Lead users' participation in the latter parts of the product development process could have more to do with providing insights for future versions and ameliorations of the product. Best practices for involvement include early integration to the development process and paying attention to both managements' and the project teams' motivation for integrating users. (Enkel et al., 2005)

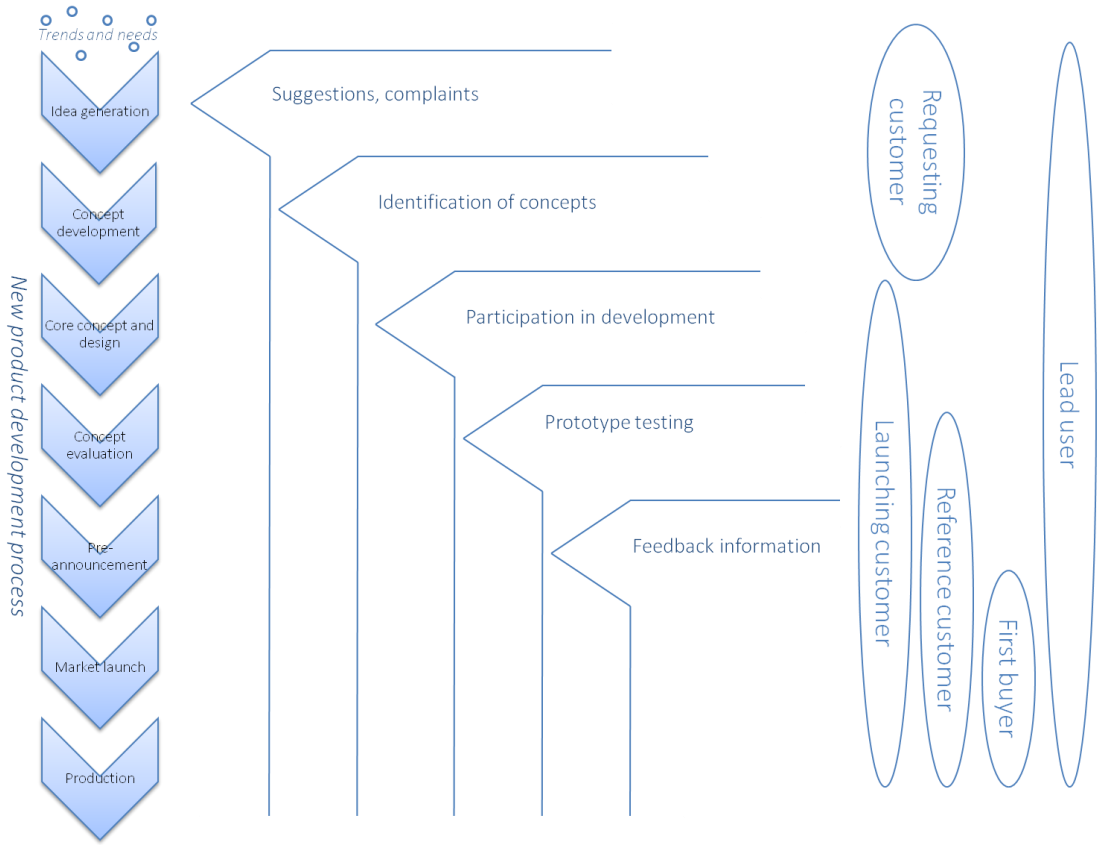

Figure 2 - User or customer types and the contribution to the new product development process (Enkel, 2005)

Lagrosen's (2005) study about three industrial companies proposes that users and companies should have integrative relationships, where users are involved as members of the product development team. Only a few essential users should be involved this way, but these should be a part of the process from beginning to end. In the study, the product development process is simplified to include three steps: 1) idea stage, 2) development stage and 3) launch stage. (Lagrosen, 2005)

Lettl (2007) suggests that with regard to the timing of user involvement, all stages are just as important. However, it would be extremely costly to try and learn all the tacit information from users and therefore Lettl (2007) suggests users to be involved in product development selectively. This means that users should not be

integrated as members of the product development team, but they should be met from time to time throughout the process in order to get their voices heard. (Lettl, 2007)

Voss et al. (2009) divide the product development process into four stages in terms of timing. They call for different types of involvement techniques at different stages. It is also unusual that all phases would include as much user involvement, but instead of giving concrete recommendations, Voss et al. (2009) conclude that this is an issue that the user-designer research community must address. (Voss et al., 2009)

The following Figure 3 summarizes these findings, and depicts the corresponding stages at the same level vertically. The green color indicates where the authors in each article have suggested that users are best to be involved. The level or depth of involvement, or the user's profile is not depicted in this figure. The depiction in figure 3 indicates that there are four most common stages in product development processes: 1) idea or idea generation, 2) development or process design, 3) testing, piloting, or prototyping, and 4) market launch. There however is not much of a consensus about the stage of involvement – suggestions shown in green color in figure 3 seem very scattered.

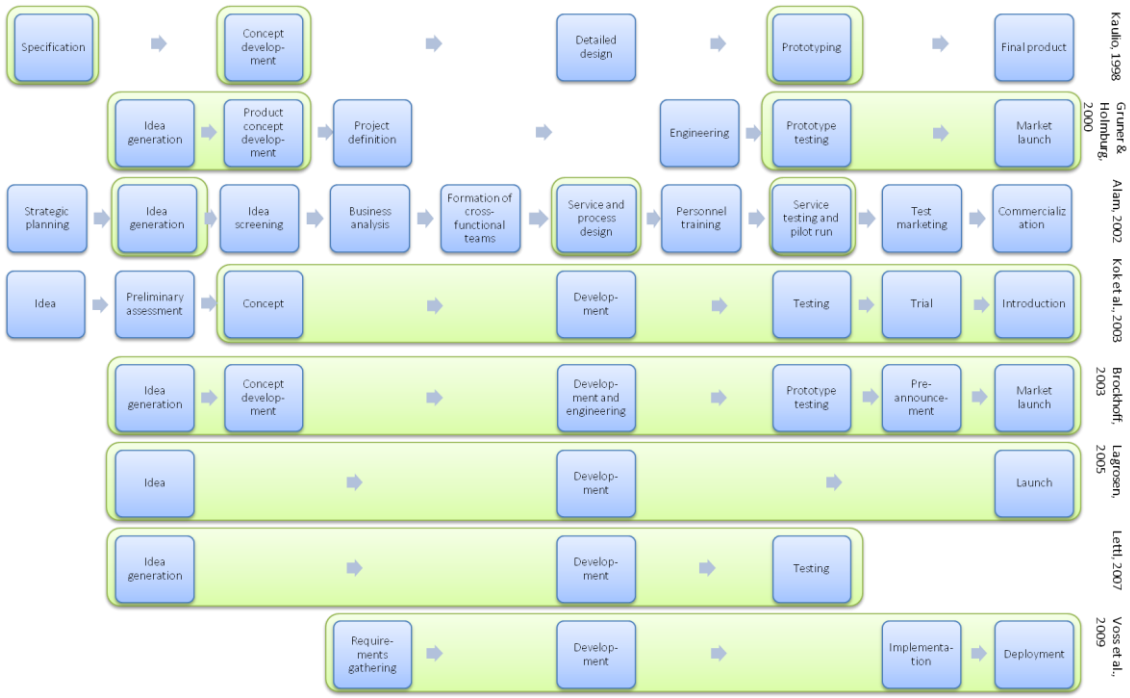

Figure 3 - Summary about product development processes and customer involvement

2.1.2.2 Modes and methods of user involvement

In addition to the timing of user involvement, the modes and methods of involvement have been given a vast amount of attention in different fields of literature. There is a multitude of different methods to involve users, and this section will present literature regarding these.

In participatory design, many user involvement methods have been used. Muller and Kuhn's (1993) research summarized many of these, and placed them on a two-dimension matrix. The vertical axis describes whether the method involves the user participating in the designer's design activities or whether the designer is participating in the user's world. The horizontal axis takes time and the position of activity in the development cycle or iteration into account. The key in the right corner explains the context in which the method was developed as well as the proposed group size. Figure 4 simplifies the matrix. (Muller and Kuhn, 1993)

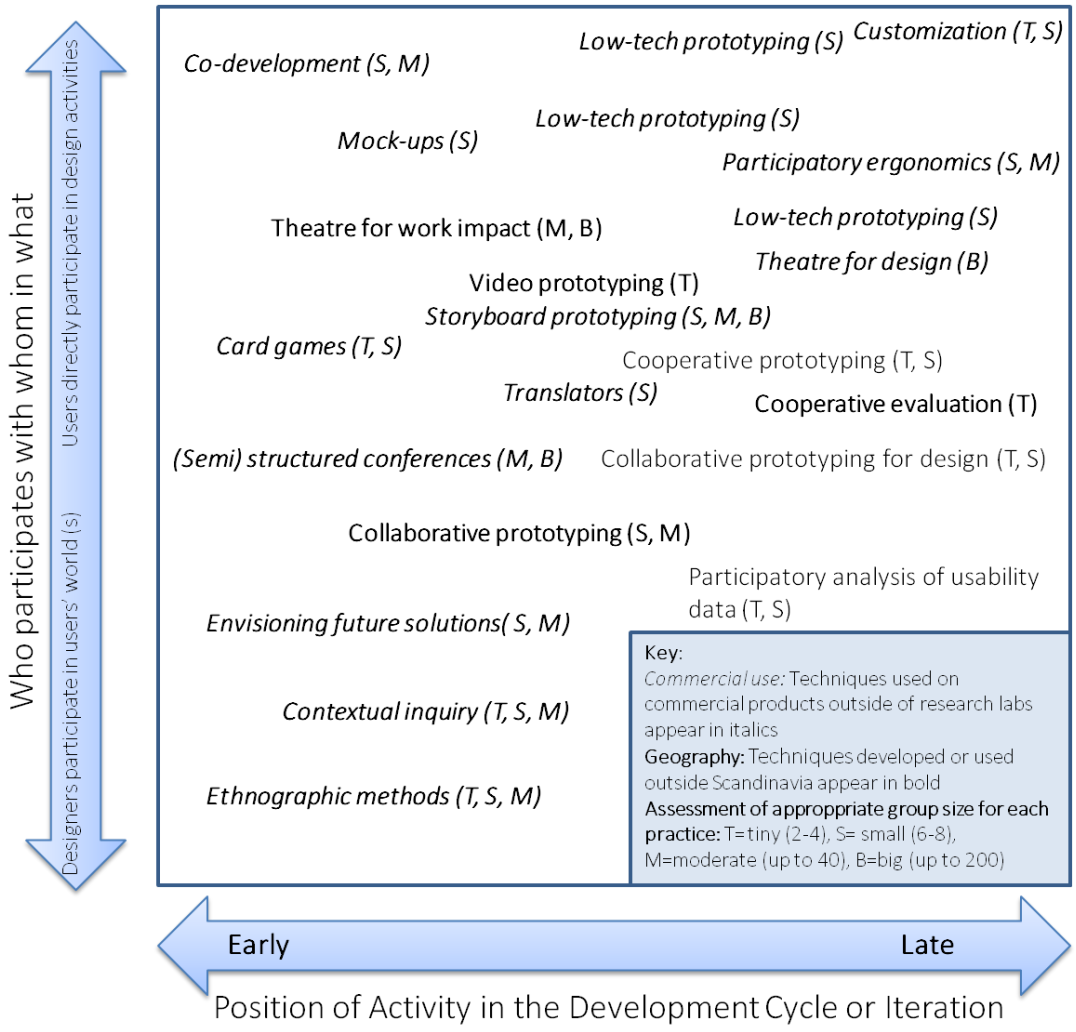

Figure 4 - Participatory design practices, simplified from Muller & Kuhn, 1993

Leonard-Barton (1998) also expects that different involvement methods should be used in different stages of product development. His classification of methods is also based in two dimensions: the maturity of the market and how new the technology is to the world. Figure 5 shows these recommended methods. (Leonard-Barton, 1998)

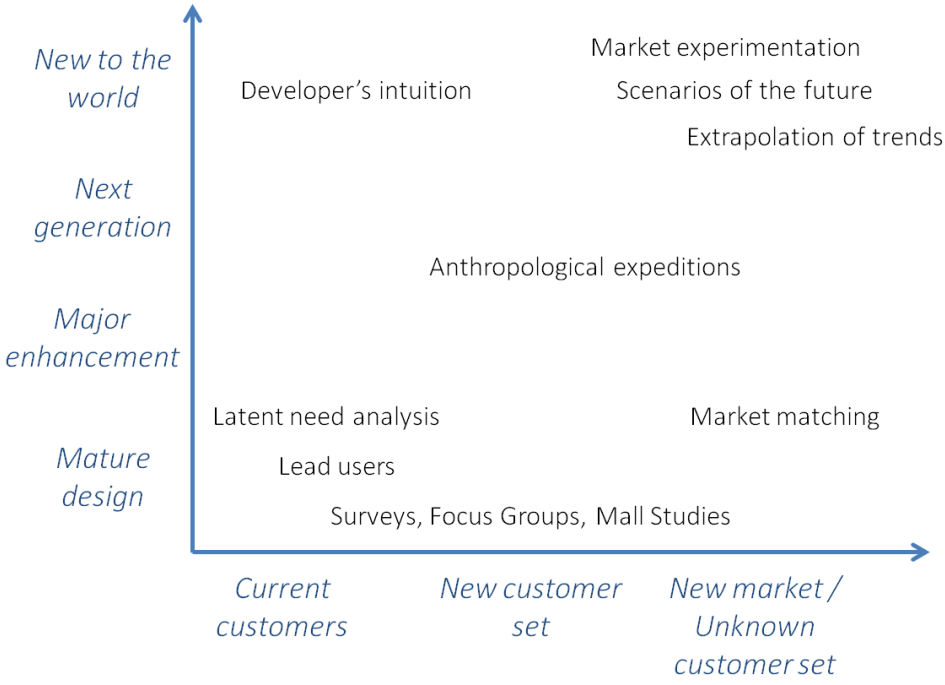

Figure 5 - Methods to help companies learn from markets (Leonard-Barton, 1998)

Alam's (2002) research concentrates on the timing of user involvement, but he also differentiates between six different methods:

1. *Face-to face interviews*, where users are interviewed in-depth in order to gather information about preferences, likes and dislikes, gaps in the market, in competitors' offerings and desired improvements etc.
2. *User visits and meetings*, where users are invited to attend development team meetings and to provide input about various aspects on the development process.
3. *Brainstorming*, a group creativity technique that aims at generating a large number of ideas after which the most creative ones can be picked.
4. *Users' observation and feedback*, where users are asked to observe and then comment on different development activities.
5. *Phone, faxes, and e-mails*, which work as information tools about different modifications and issues in the new service development process.

6. *Focus group discussions*, where users are invited to discuss several issues related to the development process.

Lagrosen (2005) presents a variety of involvement methods such as focus group interviews, Beta testing (testing of an initial version of the product) by lead users, employee visits to customer sites, Quality Function Deployment (QFD, a quality management framework) and reference groups as involvement methods. In the cases studied, very few of these were effectively used, and costs in time and money occurring from involvement were pointed out as constraints (Lagrosen, 2005).

A slightly different approach by Stigliani and Ravasi (2012) discusses the methods in which groups can make sense of unambiguous and novel situations, such as strategy making, new product development and the planning for organizational change. These processes, called *sensemaking*, are suggested to have better results if people engaged in the process do not only act in purely linguistic terms, but also engage in physical actions: e.g. drawing, building things with Lego bricks, or building paper prototypes. Visual reference helps people better grasp other people's thoughts, and even reach better convergence about the matter being developed. (Stigliani and Ravasi, 2012).

Johnson (2013) presents the concept of *develop-user social distance*, i.e. the gaps between the two resulting from diversity of users and developers, such as ethnicity, national culture, lifestyle and so on. This social distance determines which involvement method is best: the smaller the distance, the less formal the involvement methods, and the bigger the distance, the more developers have to make efforts to understand users' needs. (Johnson, 2013)

Many studies stress the importance of a cross-functional and interdisciplinary team in user involvement (e.g. Lagrosen, 2005; Matthing et al., 2004). According to Matthing (2004), innovation shouldn't be considered as solely a task for the company's engineers – a cross-functional team including marketers, engineers, behaviorists etc. should provide a better understanding about users' latent, i.e. non-expressed and hidden, needs. In Lagrosen's (2005) view, a cross-functional team with members from not only different functions, but also from outside the company should be most effective.

2.2 Lead users

In this chapter, the concept of lead users will be defined to a further extent, after which different types of lead users will be presented. Thereafter, empirical evidence of user innovation will be presented. The economical explanation of user innovation

and the connections of lead userness to creativity and opinion leadership will be introduced.

2.2.1 Definition

Lead users are "users of a novel or enhanced product, process or service (…) who display two characteristics with respect to it:

- Lead users face needs that will be general in a marketplace – but face them months or years before the bulk of that marketplace encounters them, *and*
- Lead users are positioned to benefit significantly by obtaining a solution to those needs." (von Hippel, 1986 p. 796)

Lead users are therefore in advance of the market with respect to a given important dimension that is changing over time (von Hippel, 1988). The concept of lead users presupposes that the diffusion of information, ideas, products, and services always takes time, which means that all needs cannot impact all users simultaneously (Lüthje and Herstatt, 2004). This idea of gradual diffusion has been studied by Rogers (1995), whose classification of adoption of innovations categorizes users in five main categories in terms of innovativeness, i.e. the degree to which an individual or other unit of adoption is ahead of other members of a system in adopting new ideas. The assumption of innovation adopters following a S-shaped curve over time and approaching normality (see Figure 6) is a widely recognized one, and is explained by personal character differences between individuals (Rogers, 1995 pp. 282-299). The diffusion curve bases its roots on technological environments, and is an extension of the diffusion process – a sociological model originally published in 1957 (Bohlen and Beal, 1957; Rogers, 1995).

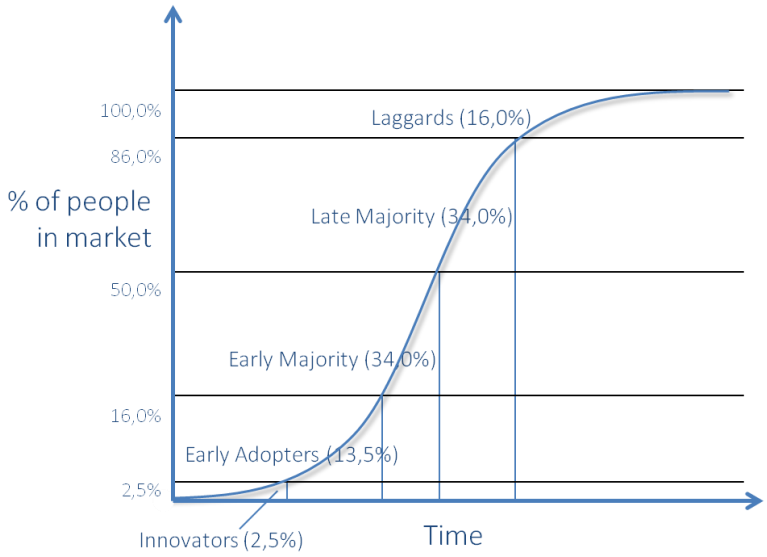

Figure 6 - Rogers' (1995) product diffusion and innovation adoption curve

Innovators, as the first adopters are called by Rogers (1995, p. 282) are the first to adopt the new technology, and are often driven by their strong interest for new ideas. Friendship cliques and communication patterns are common among innovators, even if these might be geographically dispersed (ibid.). There are a number of prerequisites for being an innovator, such as a financially stable situation that enables the person to suffer losses if the innovation backfires (ibid.). Also, a level of technical expertise as well as an ability to cope with a high degree of uncertainty characterizes innovators (ibid.). Innovators play the role of gatekeepers, and launch the process of innovation diffusion (ibid.). However, it must be noted that innovators are here the earliest adopters, and not the creators or inventors of innovations (Robertson, 1967).

After the innovators, the early adopters adopt the product. These individuals are a more integrated part of the local social system, and often serve as role models for many other members of the surrounding social system. Therefore in order to reach critical mass in innovation adoption, acquiring early adopters is a critical. The early adopter decreases uncertainty about a new idea by adopting it, and in a sense their adoption works as a seal of approval on a new idea. (Rogers, 1995 p. 283)

The early majority's adoption of the new idea happens right after the innovators and before the late majority. The early majority plays an important role in the diffusion process, as they are one of the largest adopter categories, representing a third of all members of a system. The early majority often deliberates before adopting new ideas, but is not the last to lay the old ones aside (Rogers, 1995 pp. 283-284). A common phenomenon in high-tech is that products never get past the chasm

between early adopters and the early majority. This, as Moore (2004) suggests, is because there is something fundamentally different between a sale to the early adopter and a sale to the early majority, even though the two users would be employed by the same company. Crossing this chasm, according to Moore (2004) is done by focusing on a small niche market with the highest consumer pain, and putting all resources to winning that market. By simplifying the initial challenge, the company can develop the needed amount of collateral, references, and internal procedures and documentation that will help when moving out to take additional market segments (Moore, 2004).

The late majority is more skeptical than the early majority, and therefore it takes a bit more time than the average member of a system to adopt new ideas. The size of this adoption category is as large as the early majority, and thus makes up one third of all members in a system. The late majority only adopts the new idea when it is an economic necessity or the peer pressure becomes too high to bear. This adoption group is characterized by relatively low resources and high uncertainty about the reliability of new ideas, and therefore the norm amongst members in the surrounding environment or social system must be in favor of innovations before these users adopt them. (Rogers, 1995, p. 284)

The last adoption group is the one of laggards, who is characterized by nearly being isolated from social networks in their surroundings, and by suspiciousness towards change. Users in this adoption group have almost no opinion leadership and often make decisions based on what has been done previously. They often have a precarious economic situation, which forces them to be extremely cautious in adopting new technologies. (Rogers, 1995, pp. 284-285)

As for lead users, the necessity to meet the need is so high that often they do not care how the need is met, as long as it is met (Helminen, 2012). Facing these needs ahead of the majority of the target market means that lead users are not the same people as the early adopters of an innovation. They are typically ahead of the entire adoption curve, which means that they face needs before any responsive commercial products exist. Therefore lead users often develop their own solution to these needs (von Hippel, 2007). Jeppesen and Frederiksen (2006) argue that these innovations produced by lead users complement, not substitute, the firm's own product.

Helminen's (2009) depiction combines the traditional adoption distribution curve with the lead-user concept (Figure 7). As von Hippel (2007) states, lead users' needs are present already before any standard products are available, and thus their needs can be seen as being ahead of the adoption curve (Helminen, 2009).

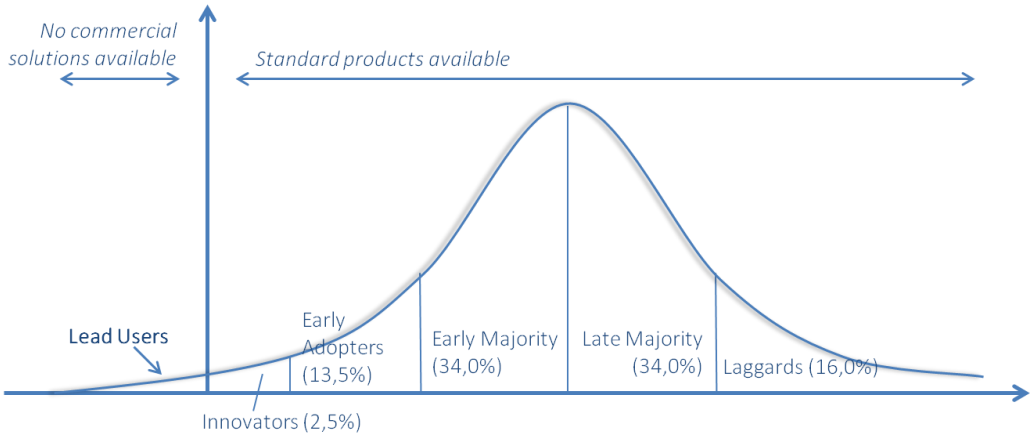

Figure 7 - Lead users' position on a market trend compared to Rogers's diffusion curve (Helminen, 2009)

Users can accurately evaluate novel product attributes or quantify familiar product attributes only if these lie inside the range of their real-world experience (von Hippel, 1988, p. 103). Studies about problem-solving have shown that people tend to be fixed to known previous uses of objects, and therefore are restrained in discovering appropriate new uses for the product and making new connections (Adamson, 1952). For example, when giving teams paperclips and a problem that could be solved by twisting one of these in the form of a hook, those teams that were given paperclips holding papers came up with the response much later than teams that were given paperclips and other equipment separately (ibid.). Anything that decreases the association between an object and a specific function will help in avoiding this problem, called functional fixedness. For example, the effects can be diminished by increasing the time following the usage of the object for its most expected purpose (Adamson and Taylor, 1954).

It is hard to predict whether users will be able to identify attributes not present in existing products of the type being studied, and in fact identification of any novel attribute is rare (von Hippel, 1988). Lead users, on the other hand, base their views on their needs rather than on existing products, and are therefore better situated with regard to functional fixedness (Lilien et al., 2002). In a way, they are "living in the future" and therefore their actual experiences allow them to have real-world experience related to future trends (Churchill et al., 2009). This makes lead users especially appealing to product development (Helminen, 2009).

2.2.2 Types of lead users

Part of the lead-user research approach is that lead users are not always users in the company's field of expertise (e.g. Churchill et al., 2009; Enkel et al., 2005; von Hippel,

1986). According to the generalization of Churchill et al. (2009, p. 9), there exist three different types of lead users:

1) lead users in the *target* application and market
2) lead users of similar applications in advanced "*analog*" markets
3) lead users with respect to important *attributes of* problems faced by users in the target market.

Lead users in the *target* field are experts relating to the identified trends in the target market (Churchill et al., 2009 p. 10). Lead users of similar applications in advanced "*analog*" markets are users in more demanding but related markets (ibid.). Already in one of the earliest articles about lead users, von Hippel (1986) suggested that companies should seek lead users in analogous user groups, and in places where the potential benefits for users are maximized. This means that e.g. a manufacturer of composite materials used in cars identifies a trend toward lighter, higher strength materials, and may well find the lead users to be aerospace rather than car firms, because of the higher potential upside for aerospace companies. Also, it is not always necessary to identify lead users that are knowledgeable about the entire novel product, process or service, but rather find lead users with respect to only a few of its attributes – or even a single attribute. (von Hippel, 1986)

The value of getting acquainted with *analogous* markets has been emphasized by many studies (e.g. Churchill et al., 2009; Poetz and Prügl, 2010; von Hippel, 1999). As novelty is a key driver of successful innovation, collaborating with problem-solvers from contextually distant but specifically analogous domains has been found to increase the likelihood of developing successful innovations (Poetz and Prügl, 2010). For example, the automobile industry has benefited a lot from innovations developed originally for the aerospace industry: antilock breaking systems (ABS) are in fact an invention that was first used in aeroplanes (von Hippel, 1999).

The third category of lead users, those that are at a leading-edge with respect to important *attributes* of needs faced in the target application, could be experts in only a small domain that relates to the target application (Churchill et al., 2009 p. 10). For example, if product developers in the automobile industry were looking for low cost fasteners, they could look into fields that have big pressures of keeping costs down, such as toy manufacturers (ibid.).

2.2.3 Empirical findings about innovating users

Several studies have shown that users have been the developers of many commercially successful innovations both in industrial and consumer markets (e.g. Churchill et al., 2009; Franke and Shah, 2003; Franke et al., 2006; Morrison et al.,

2000a; Oliveira and von Hippel, 2011; Schreier et al., 2007; Urban and Hippel, 1988). A variety of product and service innovation has therefore been realized by users instead of manufacturers (Churchill et al., 2009). Oftentimes, these innovations have been preferred by mainstream markets and found to have more commercial value than products or services developed solely by manufacturers (e.g. Churchill et al., 2009; Franke et al., 2006; Lüthje and Herstatt, 2004; Urban and Hippel, 1988; von Hippel, 1988).

Empirical evidence to back the argument of users' innovations being preferred by the mainstream market compared to other offerings available has been presented in numerous cases. One of the first lead-user studies by Urban and von Hippel (1988) presents the case of PC-CAD software development. After sampling 136 users, it was found that 23% of users had developed solutions for their own use. In addition, five lead users developed an improved PC-CAD system, which was significantly preferred by the mainstream market over other systems available (Urban and Hippel, 1988).

Morrison, Roberts and von Hippel (2000) studied computerized information search systems by libraries and found that 26% of users in the field had innovated in order to meet their own needs. A significant fraction of these innovations were regarded to have commercial value from the system suppliers' perspective (Morrison et al., 2000a).

Franke and Shah (2003) explored different extreme sports (sailplaning, canyoning, boardercross, handicapped cyclists) and with a sample of 521 users. 32% of them had created solutions for their own use, and over 40% of these innovations solved an urgent need, and 14.5% of these innovations were regarded as completely new products in their field. Almost one quarter of lead user innovated products were produced by a manufacturer, and hence it was concluded that innovations generated by lead users have commercial potential also among other users than those with lead-user characteristics. (Franke and Shah, 2003)

Lüthje (2003) studied user innovations in medical surgery equipment and found that 22% of the 261 users in their sample had developed new equipment for their own use. 48% of these innovations were or would be soon produced for larger markets by manufacturers, and it was concluded that lead userness explains likelihood of user innovation. (Lüthje, 2003)

Franke and von Hippel (2003) investigated user innovation in Apache web server security software, and found that 23% of 138 users were user innovators. Lead userness was found to explain user innovativeness as well as the attractiveness of

these innovations. Also, being ahead of a trend was found to explain user innovativeness. (Franke and von Hippel, 2003)

Lüthje's (2004) study concerned user innovations in the field of equipment for outdoor sports. Out of 153 users in four different sporting activities (climbing/mountaineering, hiking, cross-country skiing, and mountain biking), 10% were found to have developed solutions for their own use. Based on these findings, it was suggested that companies try to sell their products to a group of consumers that is willing and able to provide creative ideas for their products. This way, manufacturers can enhance their customer orientation and increase knowledge about market needs. (Lüthje, 2004).

Lead userness explained the likelihood and the attractiveness of user innovations also in Franke et al.'s (2006) study in the kite-surfing equipment industry. In their sample of 456 users, they found that 31% of users had innovated for their own use. Users that were ahead of a trend and positioned in a way that enabled them to benefit from the innovation came up with more attractive innovations than their peers. (Franke et al., 2006)

In their lead-user research in the field of extreme sports (kite surfing and technical driving), Schreier et al. (2007) found that lead users thought new products were "less complex" than did their peers. Also, lead users had high opinion leadership and a leading-edge status among their surrounding group that made them valuable assets to marketers of new products (Schreier et al., 2007).

In a more recent study by Oliveira and von Hippel (2011) about user innovation in the field of computerized banking services in the United States, user innovation was extremely high: 44% of innovations in retail and 55% of innovations in commercial banking were first developed by users. In the case of offerings preceding computerized banking software, as much as 80% of retail and 92% of commercial banking solutions were developed by users. An illustration of user innovations in the computerized retail banking sector includes the service of "multiple institution account information aggregation". This is a service that automatically contacts each financial organization where the retail user has an account, logs on using the user's passwords, collects information about the accounts, logs off, and then combines this information into a spreadsheet tailored to the user's specifications. Oliveira and von Hippel (2011) concluded that incorporating lead users in service development is just as beneficial as incorporating lead users in product development. (Oliveira and von Hippel, 2011)

Table 1 summarizes the results from the previously mentioned studies about user innovation and lead-user quests. It follows the examples provided in Lüthje and Herstatt's (2004) and Schreier and Prügl's (2008) articles.

Table 1 - Summarizing table about findings of user innovation and its consequences

Author	year	Nature or field of innovation	Number of users (n)	% of users who developed solutions for own use	Findings: Effect on company, market reaction or lead-user characteristics
Urban & von Hippel	1988	PC-CAD software systems	136	23 %	The concept developed by users was significantly preferred by customers compared to competing offerings available on the market
Morrison, Roberts and von Hippel	2000	Computerized information search systems used by libraries	102	18 %	A significant fraction of user innovations were regarded to have commercial value from the information system suppliers' perspective
Franke and Shah	2003	Sailplaning, Canyoning, Boardercross (snowboard), Handicapped cyclists	521	32 %	Over 40% of the innovations generated by lead users solved an urgent need, and 14,5% of innovations were regarded as completely new products in their markets. Almost one quarter of innovations were produced for sale by a manufacturer, which means that a large part of the innovations have commercial potential in mainstream markets.
Lüthje	2003	Medical surgery equipment	261	22 %	Lead userness explains likelihood of user innovation. 48% of innovations by lead users were or could soon be produced by manufacturers of medical surgery equipment.
Franke and von Hippel	2003	Apache web server security software	138	23 %	Lead userness explains likelihood of user innovation, as well as the attractiveness of the innovations. Being ahead of

					a trend predicts user innovativeness.
Lüthje	2004	Outdoor-related consumer sports products	153	10 %	Innovating efforts in outdoor sports were found to be focused on a significant portion of users with lead user characteristics. 40% of innovating users contacted manufacturers in order to commercialize their innovation, but there is still much potential in the ideas of users that never reach manufacturers because their lack of involvement.
Franke, von Hippel, Schreier	2006	Kite-surfing equipment	456	31 %	Lead userness explains likelihood of user innovation, as well as the attractiveness of user innovations. Users that are ahead of a trend and obtain benefit from the innovation come up with more attractive innovations.
Schreier, Oberhauser, Prügl	2007	Extreme sports: kite surfing and technical driving	332	not indicated	Lead users tended to perceive new products as "less complex" than more ordinary users. In addition to innovating, lead users were found to be relevant in both adoption and marketing of new products because of their leading-edge status and opinion leadership in their communities.
Oliveira and von Hippel	2011	Computerized banking services	36	44% for retail banking and 55% for commercial banking	Service innovations, just as product innovations, are often developed by lead users. In offerings that preceded computerized offerings, as much as 92% of users in corporate and 80% in retail banking were the actual innovators of manually functioning banking services.

As straight-forward as the positive effects that lead users bring to the success of new products seem, incorporating lead users has not always rewarded the company with blockbuster products and services (e.g. Carbonell et al., 2012; Enkel et al., 2005). For example, Carbonell et al. (2012) found in their study about customers' lead userness that lead-user characteristics of a user had a direct negative impact on market performance. The reason was unclear, but two possible explanations could be established. The first possible scenario is related to the fact that lead users in many cases are technologically more competent than the overall market and therefore their preferences and desires might differ from those of more average users (e.g. Enkel et al., 2005; Moore, 2004).

The other possible reason for this unfavorable effect on the product's market performance could be appointed to the unclear timing issues: the stage of the development process in which lead users are involved could have an effect on performance (Carbonell et al., 2012). In Enkel et al.'s (2005) case where lead users were sought for an engineering company, the development team didn't realize the full potential lead users could have and only included them in the development process when prototypes were ready at hand. This highlights the importance of both the project teams' and managements' motivation: one must be aware of the dangers of the not-invented-here syndrome and other mistaken expectations (Enkel et al., 2005). Motivational issues from both the user's and the new product development team's perspective will be studied in section 2.6.

2.2.4 Economical reasoning

Being ahead of the majority of the target market also means that the nature, risk, and eventual size of the target market are often not clear to companies developing new products. Hence, companies do not see big enough incentives to innovate, which in turn increases the probability of a lead user being the first to develop innovative solutions that later face mainstream market demand. (von Hippel, 2007)

This can be explained by economic theory: if firms decide to innovate, they expect rents from that investment. Also, it is in firms' best interest to minimize innovation costs and maximize returns from innovations. Rents from successful innovations can be captured by innovators by establishing some sort of monopoly control over their innovation and then using this control to increase economic returns. Patents are often ineffective, and thus it might be hard for firms to predict an opportunity to cash in on the profits generated from a successful innovation. Users, on the other hand, are able to keep innovations as secrets, as contrarily to firms, they do not have

to tell anyone about having innovated. Firms, on the other hand, have to publicly tell about their innovations in order to sell those (von Hippel, 1988, pp. 58-61).

The incentive to innovate is bigger for users, as they will ultimately be the only ones benefiting *directly* from having a better and more efficient way of doing things. Firms or manufacturers selling the ameliorated, innovative product only benefit indirectly, by selling products or services incorporating innovations (von Hippel, 2005). The intensity of interest in ameliorating current products or services is very high, when users care a great deal about having just-right products or services to use (von Hippel, 2005).

The benefits for the firm can be explained by the possibility to build barriers to enter for foreclosing competitors. If user information is integrated into the organization effectively, the transaction costs for the customer to train a new supplier will increase. Also, being able to better respond to user needs molds customer expectations and satisfaction. This in turn will influence the decision about changing a supplier from the customer's point of view because of the product or service quality they have enjoyed. (Pitta and Franzak, 1997)

First studies about innovating users suggests that lead users, who develop their own solutions and improve products, are willing to share their information freely and do not engage in commercialization activity (e.g. von Hippel, 1988). For example, in the context of outdoor sports, users mainly innovated in order to solve their own problems and didn't care for the commercialization of their ideas (Lüthje, 2004). The likelihood that users start a company based on their innovation is affected by opportunity costs, as well as their estimate of the financial returns from commercialization. Compared to manufacturer innovations, users are often more knowledgeable about the potential markets and have more detailed information about the industry. Manufacturers, on the other hand, are advantaged in situations where commercializing innovations requires more complementary assets such as distribution channels (Shah and Tripsas, 2012).

In a study about user entrepreneurship, Shah et al. (2012) found that users engaging in entrepreneurial activity are not as uncommon as thought: a sizeable fraction, 10.7% of all US startups, is founded by users. The study divided user entrepreneurs in three different categories: professional-user entrepreneurs (have founded firms around innovations meant for use in previous employment), end-user entrepreneurs (innovations made for personal use and firm founded around it), and hybrid professional/end-user entrepreneurs. Out of these three user entrepreneur types, professional-user entrepreneurs are the most successful ones in terms of

getting financing, building a growing venture and also utilizing human capital. (Shah et al., 2012)

2.2.5 Lead userness and creativity

The relationship between an individual's lead userness (the extent to which a user is characterized by lead user features) and creativity has been discussed, and a positive correlation between these has been found (Faullant et al., 2012; Kratzer and Lettl, 2009). This can be largely explained by the position of people in their social networks: people who are situated in *bridging* roles – enabling the combination of multiple knowledge bases – have an advantage in seeing good ideas (Burt, 2004).

According to Amabile (1996), innovation by individuals or teams always requires creativity. Creativity is here defined as "the production of novel and useful ideas in any domain" (Amabile, 1996, p. 1). The novelty of an idea does not mean that it should be completely new, but it has to be something different from what has previously been applied in the domain in question (Amabile, 1996). Also, creativity is not enough in itself to fuel innovations – management practices, resources and organizational motivation all influence the generation of innovative ideas (ibid.).

The key to creative thought appears to be the combination and reorganization of information, knowledge and concepts in order to advance new understandings (Mumford, 2000). This is why including people with vast networks (Burt, 2004), who appear skilled at integrating a variety of activities and interests around their work (Mumford, 2000), seems to make sense. Tentatively, a user who has generated a new idea for a product or service based on personal and *sticky* (i.e. difficult to transfer) user environment information, will likely suggest a creative product idea not available from a company perspective (Kristensson et al., 2004). The *stickiness* of information is related to the costs that incur from transferring information so that it will be usable to a given information seeker (von Hippel, 1998). The *stickiness* may arise from the information's encoding, or it may be due to attributes of information seekers or providers (ibid.). Von Hippel (1998) has argued that the more *sticky* the local information, the more problem-solving will be done by those directly benefiting from a solution and who have difficult-to-transfer local information, such as the direct users of a product or service. As the information used for problem-solving is different for users with *sticky* information and companies, users can combine this *sticky* information with newly acquired knowledge from cooperating with the innovating company, and generate new relations and more creative ideas (Kristensson et al., 2004).

2.2.6 Opinion leadership

Besides providing important input to the development of new products, lead users can be helpful also in the marketing of products. This is because lead users are often not only knowledgeable relating to a specific trend, but also often have a leading-edge status that might empower them to serve as opinion leaders (Schreier et al., 2007). Some have even stated that opinion leadership is a by-product of lead userness, so much the two concepts are interleaved (Bilgram et al., 2008). Others have found that lead userness and opinion leadership are not two entirely different concepts, and show a slight correlation (Kratzer and Lettl, 2009).

Being an opinion leader means that the lead user could be able to influence others in the market. Significant relationships between a user's leading-edge status and opinion leadership have been found, as long as the user is well networked. Leading-edge users have been found to often be in *bridging* roles, which means that they enable exchange of information into the industry from outside. Therefore they play an active role in the diffusion of innovations, and can be used as a resource for marketing (Morrison et al., 2000b).

It has been suggested that opinion leaders are more innovative than their followers, but only if the surrounding social system's norms favor change. If the social norms are more traditional ones, it is likely that innovators are a separate set of individuals and therefore do not have strong opinion leadership characteristics. Often, in change reluctant environments, innovators (i.e. the first adopters as called by Rogers) are treated with disrespect and suspicion. If innovations are adopted too promptly, the opinion leader will confront more reluctance than if he or she tries to understand the followers and keep at their pace (Rogers, 1995, p. 318).

The ability to influence others can be explained by the user's position in the network: hubs, people who are connected to many other people, can help propagate consumer buzz about products (Barabasi and Bonabeau, 2003). Therefore, if lead users have a central position in a network, it is likely that they show some opinion leadership characteristics (Kratzer and Lettl, 2009).

2.3 The lead-user method

This section presents the four-step method for lead-user identification by von Hippel (1988), and then introduces some further developments of the method. Some criticism to this method is also presented.

2.3.1 The four-step lead-user method

Several studies have reported that the ideas using input by lead users have much higher commercial attractiveness than ideas emerging from traditional product development processes, where manufacturers first explore user needs and then develop reactive products (Griffin, 1997 cited in Franke et al., 2006; Lilien et al., 2002; von Hippel and Katz, 2002; von Hippel, 1988). Therefore it is in the interest of companies in pursuit of renewal and growth to try and identify lead users in their fields of expertise.

Von Hippel's (1988) lead-user method bases its roots in the constraints of traditional market research. In these research methods, groups of consumers that are familiar with a particular product category are gathered to discuss features of potential or current products (von Hippel, 1988). Especially service businesses have faced challenges with traditional market research methods, because it is seemingly difficult for customers to envision services that have never existed before (Flint, 2002; Matthing et al., 2006). Researchers aren't encouraged to look beyond their own typical consumer profile, and often miss out on information that analogous fields could offer (Intrachooto, 2004). Von Hippel's (1988, p. 103) research indicates that typical users aren't well situated to evaluate unfamiliar product and process needs, which creates a need for lead users.

The four-step method by von Hippel (1988) has the following steps:

1) Identifying an important trend,
2) Identifying lead users,
3) Analyzing lead-user data,
4) Projecting lead-user data on the general market of interest.

Before being able to identify a lead user, one must specify in what respect the user has leading-edge information and competences. Methods to assess the trends impacting the marketplace range from intuitive expert judgments to more formalized methods such as the "Delphi" technique, or simple trend extrapolation and correlation and econometric models. Even with these well developed and formalized methods, there is much intuition involved in trend identification, and the actual process can be both informal and accurate. (von Hippel, 1986)

Identifying lead users at the leading edge of a given trend is a process where one can start by developing an understanding of the marketplace, its key players and people in this field. Judging which firm is at the forefront of the trend in question and who would be situated in a way that obtaining a solution relating to the trend would benefit the user significantly is the next task. One way of determining this

positioning is assessing the potential benefits of users in the marketplace. Another is to try to identify users who are already actively innovating to solve problems relating to the trend. Other methods include surveying and thereby seeking people with leading-edge information. (von Hippel, 1986)

Analyzing data derived from lead users and their experiences can be incorporated in the market analysis using standard market research techniques. One could, for example, look for people or companies that have made investments regarding the trend considered. Looking for existing products that have not yet been applied to the problem in question is another way of finding lead user data. (von Hippel, 1986)

Because lead users differ significantly from the typical user profile of the product or service to be developed, projecting lead-user data onto the general market of interest is needed. One approach could be prototyping the product and asking a sample of users to test it. Making adjustments based on the feedback received this way would make the product potentially more usable to the general market. However, this approach needs time and might be problematic to implement in high-tech and more dynamic industries. (von Hippel, 1986)

Lüthje and Herstatt (2004) present a version of the von Hippel (1988) lead-user method that includes four specific steps:

1) Start of the lead user process,
2) Identification of needs and trends,
3) Identification of lead users and
4) Concept design.

The method is based on the identification process suggested by von Hippel (1988) already presented above. Figure 8 illustrates the simplified lead-user process by Lüthje and Herstatt (2004):

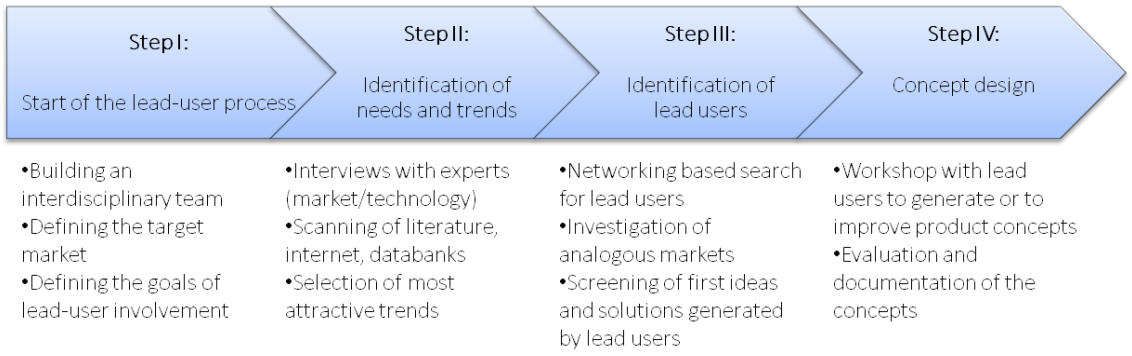

Figure 8 - The process in the lead-user method by Lüthje and Herstatt (2004)

The first step of starting the lead user process includes building the interdisciplinary lead user identification team, considering resource questions such as the time available, as well as the adequateness and usefulness for the search in the given context. The target market and goals for the involvement of lead users are specified. (Lüthje and Herstatt, 2004)

In the second step, the team identifies user needs and trends. These trends can be either related to technological or market changes in the search field, or to more general economic, legal and social developments that will probably affect the market in the future. In this stage, interviews with experts in a wide variety of fields of expertise have proven especially valuable. Searches on the internet, in databanks etc. will help in identifying trends. The most critical part in this stage is, however the most challenging one: selecting the identified trends. Decisions about e.g. how deep into analogous fields it is useful to dig will have to be made. (Lüthje and Herstatt, 2004)

The third step, lead user identification, is especially relevant for this thesis. Based on the previously conducted trend analysis and expert interviews, the team must start off the third phase by determining the indicators that will allow for the identification of a lead user. Some indicators proven useful in previous cases are e.g. dissatisfaction of the users with the current market offerings (indicator of high benefit expectations). Another useful indicator has been the repeated expression of ideas to the sales team – information that rarely reaches the R&D department. The severity of the problems that the users faced is another indicator, but identifying this severity based on e.g. customer complaints or reports of sales representatives is still an area with much uncertainty. Overall, the process of identifying lead users is a creative one that often combines the use of several methods, out of which screening and networking (also called broadcasting in e.g. Mäkinen et al. (2013)) are commonly used ones. The next subsection 2.4 will focus on giving light on the different types of identification methods. (Lüthje and Herstatt, 2004)

The fourth step, concept design, is more related to involving lead users, and will be studied further in the following section 2.5. In this step, relevant topics include assessing the benefits for lead users, and choosing the accurate methods of using lead users' knowledge (arranging workshops, continuous interviews). (Lüthje and Herstatt, 2004)

Churchill et al. (2009) present a different version of the four-step model. They talk about the following four phases:

- Phase 1: Preparing for Your Lead User Project
- Phase 2: Identifying Trends and Key Customer Needs
- Phase 3: Exploring Lead User Needs and Solutions
- Phase 4: Improving Solution Concepts with Lead Users and Experts

The first phase is mainly about "homework" and defining the goals for the project. Also, a project team of three to four people from technical and marketing backgrounds should be initiated. In the second phase, the team officially launches the lead-user study. Emerging market needs and trends are sought. Top trend and market experts are interviewed so that the most relevant trends can be selected. In the third phase, the team implementing the lead-user study makes sure that the selected trends have good business opportunities, but the focus in this phase is in the interviews with lead users. Also, attributes of the product concept to be developed should be generated so that the needs identified in phase two are met. The team's task in the fourth phase is to develop a written product or service proposal that is based on the previously acquired knowledge. A lead-user workshop is held, which is a two- or three-day event where users along with designers do intensive design work. Decisions about which users to invite to the workshops should be based on the users' abilities to contribute to the design of the concept. After the fourth phase, the concepts should be presented to management, who will decide which concepts will be tested. (Churchill et al., 2009)

2.3.2 Criticism of the lead-user method

The lead-user method by von Hippel (1988) has not only received praise among its practitioners. Intrachooto (2004) tested the method in seven case studies in novel energy efficient solutions in built facilities, and concluded that it seems unlikely that lead users could contribute innovative solutions in the building industry. The data from their research shows how innovations stemmed from designer teams, and not individual users as in the von Hippel (1988) method (Intrachooto, 2004). Also, quite unexpectedly, Intrachooto's (2004) study showed that most of the energy efficient innovations were achieved by people who were already familiar to one another, as opposed to a random selection often preferred in the von Hippel (1988) method.

Intrachooto (2004) assumes that the lead-user method's inapplicability stems from the fact that in the built environment, the second condition of a lead user being someone positioned to benefit from a solution to the problem, cannot be completely met. As energy efficient buildings' users are not the same people that are behind the

innovations, the lead-user method may not apply. Also, Intrachooto (2004) criticizes the method for assuming that 1) expert users will lead to innovations, 2) lead users already exist and need only to be identified, 3) individual needs are the source of innovations and 4) products are single-purpose or task-specific. (Intrachooto, 2004)

Another problem related to the original lead-user method (von Hippel, 1988) is the fact that it does not provide very concrete tools to identify lead users. The second step of identifying lead users only suggests the researchers should research the market, attempt to identify companies that are actively innovating in the field and also survey people with leading-edge information (ibid.). How these people with leading-edge information are found, is not stated. The following section 2.4 presents a number of research methods that are more repeatable than the original lead-user method.

2.4 Identifying lead users

Methods for identifying lead users are often the same as for trying to identify other rare individuals within a dispersed, hidden population. In this subchapter, a number of different research approaches are presented. The structure for this chapter is based on the classification presented in Mäkinen et al. (2013), whose approach of Mountaineering will be presented as the final lead-user identification method.

2.4.1 Snowball and pyramid sampling

Sometimes researchers are faced with the problem of having to find people in a proportionally rare population, and a sort of "referral" method sometimes called "snowball sampling" can then prove efficient. In practice, these rare individuals are found by asking each identified member of the target population to supply additional names. As the quest continues, more and more people with the desired characteristics will be found (Welch, 1975). The method has been used in various fields in order to find rare individuals such as prostitutes and hustlers (McNamara, 1994), families that have suffered maternal death (Singh et al., 2007), drug users (Griffiths et al., 1993) etc.

Pyramiding is a variant of the sampling method, and is based on the assumption that people with a strong interest towards a topic or trend tend to know other people with *more* knowledge about the topic. Compared to snowball sampling, the idea in pyramiding is to find the people near or "at the top of the pyramid" with respect to a given attribute (von Hippel et al., 2009). The methods of pyramiding and snowball sampling are convenient to research as one can further specify the researched attributes as one becomes more knowledgeable about the topic oneself (Mäkinen et

al., 2013). Also, as in other networking methods, there is a chance that referral will point to analogous fields in which similar challenges as the ones researched can be identified (Lüthje and Herstatt, 2004). However, the method introduces bias because the technique in itself reduces the likelihood that the identified individuals will represent a good cross-section from the population (Singh et al., 2007; Welch, 1975).

2.4.2 Screening

Screening is a research method where information of all of the individuals in a population is collected in order to identify a subset of individuals with the desired characteristics (von Hippel et al., 2009). The approach is suitable if the amount of users to be screened is manageable and it seems plausible that all of the users in the market can be screened (Lüthje and Herstatt, 2004). In order to increase the probability to find these rare users, the total number of people in the research must be raised, which will make screening very laborious and represent a major part of data collection costs (Sudman, 1985).

Stockström et al. (2012) suggest that as the size of the social network to be researched increases, pyramiding becomes comparatively more efficient than screening of users. This suggestion is based on their research where they expected to find subjects with special qualities in networks of school children. By comparing the efficiency of screening and pyramiding, they found the relative efficiency of pyramiding to almost double as the size of the network increases (Stockstrom et al., 2012). Previous studies such as a lead-user quest conducted by von Hippel et al. (2009) in the field of website design have concluded that pyramiding is a much more cost-effective way to identify lead users than screening. In their study, von Hippel et al. (2009) reported that the identification of lead users by the pyramiding procedure cost only 15% of the cost incurred in the screening method.

2.4.3 Broadcasting

Whereas the two previous methods are based on the researcher trying to solve his or her problem, in broadcasting the researcher is engaged in as little problem-solving as possible. This is done by attempting to interest a heterogeneous set of *external* actors in finding solutions to internal problems (Lakhani, 2006). In practice, many successful broadcasting quests have used online social networks or blogs in order to find innovative users (Droge et al., 2010).

The technique bases its roots on Granovetter's (1973) notion of the strength of weak ties: while strong ties enable efficient transfer of knowledge and information, weak ties can prove much more valuable. This is because weak ties enable combinations

of previously unlinked information, by *bridging* groups and therefore help in the diffusion of information (Granovetter, 1973). As reasoned above, broadcasting enables diversification of the actual problem-solvers' local information set and problem-solving algorithms, and can bring the initial problem-holder to completely new ways of looking at the problem. In Lakhani's (2006) research, he has found that heterogeneity between problem-solvers increases the probability of the actual problem being solved, and also lowers the needed investments for R&D. Often, problem-solvers found by the means of broadcasting re-apply previously developed solutions from their own and/or someone else's work, which again implies efficient use of diverse knowledge bases. (Lakhani, 2006)

Firms attempting to externalize their problem-solving need to design the broadcasting process carefully. Because the problem-solvers nominate themselves to participate (Lakhani, 2006), the problems have to be formulated in a way that attracts experts in the domain and gives space for insightful conversation.

2.4.4 Other sampling methods

In addition to pyramiding and snowball sampling, there exist other sampling methods that present an alternative to the screening method. For example, the researcher might want to maximize the variation, i.e. to have all possible situations covered by purposive sampling. Another sampling method, one of quota sampling, divides the population into as many sub-sets as there are different characteristics to observe. In emblematic (i.e. representative or symbolic of a given feature) sampling, there can be up to three features: average, excellence and emerging, which provide a way to look at typical cases that fit a given standard. (Gobo, 2004)

In studies of hidden, i.e. proportionally rare populations, different sampling methods have also been popular (Heckathorn, 1997). In location sampling, which is better known as targeted sampling, the target population is mapped ethnographically and then interviewed at the most appropriate time of day, location, and interview strategy for the case in question (ibid.). Many lead-user quests have used a variety of sampling methods: for example, finding prominent users in online communities has been effective in some cases (Freeman, 2007). This can be done simply by utilizing online search engines or following one's social media feeds (Mäkinen et al., 2013). Another sampling method that combines ethnography with internet communities called "netnography" aims at interpreting consumer behavior of cultures and communities online (Kozinets, 1998). The method has been used in lead-user quests where it has been proven a viable method that is less costly than mass screening (Belz and Baumbach, 2010).

2.4.5 Investigating user solutions

Since lead users face strong needs related to a problem, they often become innovators themselves and build solutions or iterate existing products so that their needs will be met (e.g. Baldwin et al., 2006; Jeppesen and Frederiksen, 2006; von Hippel, 1988). Therefore pyramiding and snowball sampling might sometimes lead to solutions, and not only people related to the studied trends (Mäkinen et al., 2013). Once these solutions have been found, they can be investigated by e.g. trying them out, letting experts evaluate them, by running software demonstrations or assessing the peer commentary about the solution (ibid.).

2.4.6 A combining approach: Mountaineering

Based on their research, Mäkinen et al. (2013) suggest that in reality an element of skill, intuition, and combination of methods is usually best in the lead user identification process. They propose a new method, one of Mountaineering, which combines a set of previously known approaches, and is likely to be a powerful method in finding rare subjects. (Mäkinen et al., 2013)

Mountaineering differs from the previously presented research methods substantially: it is an opportunistic identification strategy where a varying set of search forms are used concurrently. Research subjects are approached and found with different search methods that are alternated and used sequentially. The research process includes variation of individual methods such as screening and pyramiding. The search can be started with many different starting points or methods, and changes are made iteratively throughout the process. In their studies where the method has been tested, Mäkinen et al (2013) found it especially important that identification methods are not restricted to only one after the initial phase. In fact, in one case, one of the lead-users identified in the process was found behind other solutions and organizations. Also, some solutions were found in analogous fields (Mäkinen et al., 2013). Figure 9 illustrates the process of Mountaineering.

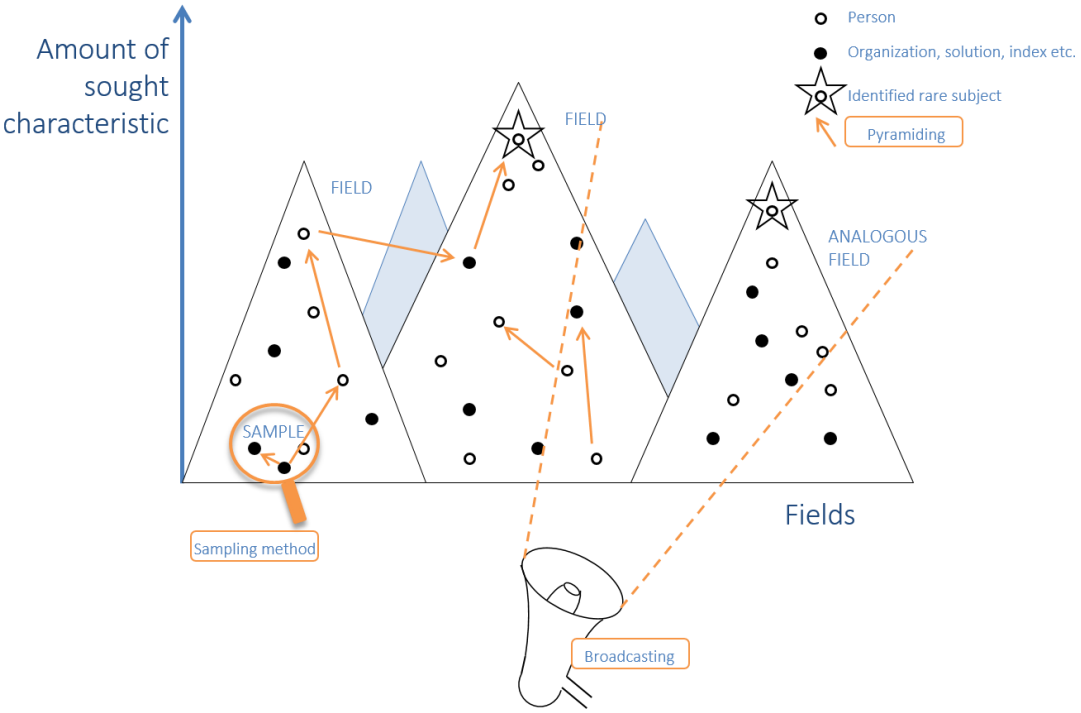

Figure 9 - The process of Mountaineering, modified from Mäkinen et al., 2013

2.5 Involving lead users in product or service development

The literature that studies user involvement from the perspective of lead users is scarce, as more research is conducted about users in general. Many studies have a different view on this involvement: some see the identification of lead users in itself being a best practice for user involvement (Brockhoff, 2003; Enkel et al., 2005; Gruner and Homburg, 2000; Lettl, 2007) and others study best practices with the presupposition that these involved users are lead users (Lüthje and Herstatt, 2004; Olson and Bakke, 2001).

2.5.1 Lead users as a best practice

In Gruner and Holmburg's (2000) research, the depth of user involvement is linked to the stage in which users are interacting with the company. Their results indicate that user involvement is more valuable in the more concrete stage of concept development. Involvement is valuable also in the later stages, but not enough focus is given to the earlier stages in the new product development process. The study also indicates that lead user characteristics for the involved users predict the success of products being developed. Also, financially attractive customers seem to be valuable cooperation partners. The model is depicted in Figure 10. (Gruner and Homburg, 2000)

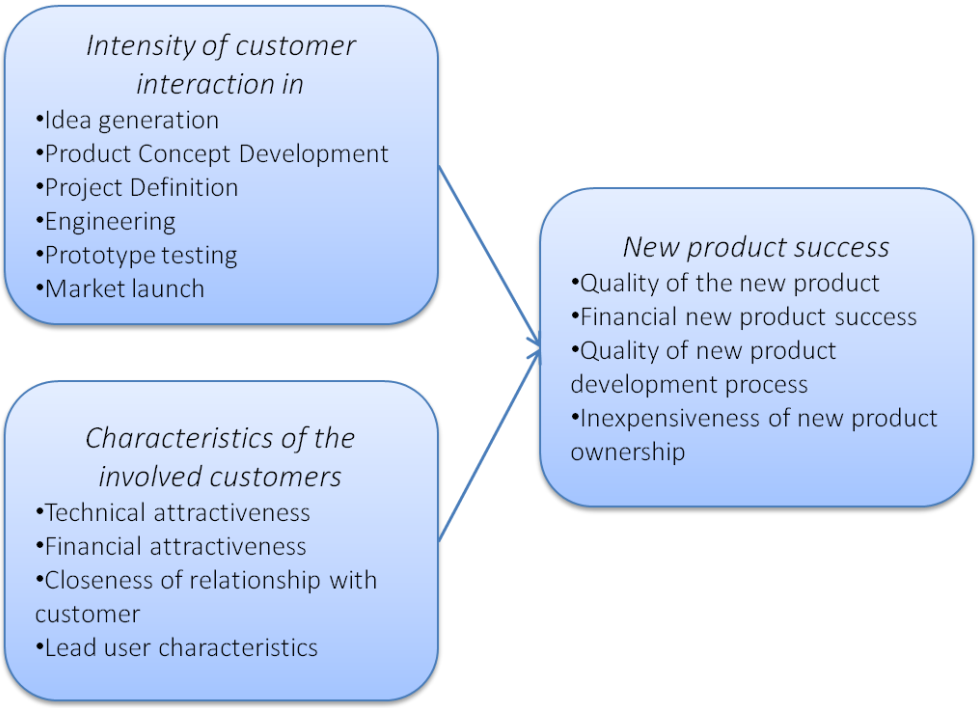

Figure 10 - Conceptual framework for user interaction (Gruner & Holmburg, 2000)

In addition to observing the depth of user involvement and the type of user to involve, Gruner and Holmburg (2000) also suggest that it is of importance who in the company is in charge of user involvement. The R&D director typically has a wider view of the complete new product development process whereas the marketing director might be more helpful in later stages of the process. (Gruner and Homburg, 2000)

Brockhoff's (2003) research about user involvement discusses the involvement process from the user's perspective. His findings suggest that it is of importance whether involving the user to product development is initiated by the supplier, or perhaps by the user in the form of complaints or suggestions. For example, the user might expect higher rewards from participation if it is initiated by the company, and not by the user. Users might prefer to develop ideas in groups if they enjoy network benefits or community effects, such as reciprocity or reputation. Also, they might prefer to participate in involvement projects where they have been aware of the selection process: being among the chosen ones could feel like an honor. Brockhoff (2003) considers involving expert users such as lead users as a best practice for involvement, but does not differentiate among the different modes of involvement that are required for lead users and for other users. He concludes by saying that the optimal basis for involvement of users is when concepts are being developed with basis on innovations originally developed by users. This also suggests that lead-user

involvement would be a good option for the firm willing to cooperate with users. (Brockhoff, 2003)

A study by Enkel et al. (2005) about the lessons learned in user involvement for new product development categorizes user involvement in terms of both the stage of involvement as well as the kind of user who is involved. It is suggested that lead users could be integrated to the product development process from the earliest to the last phases, whereas customers providing suggestions and complaints would be integrated only at the latter phases, where no more innovation and concept development occur. In order for a successful involvement of lead users to happen, the people responsible for the project inside the company must trust users, their skills and abilities, and be motivated towards the project. The technical ability, professional competency, tolerance of uncertainty, research resources and interdisciplinary know-how are important characteristics for the users that are involved. The value of the innovation for the user has an effect on the motivation to participate to the development process, so a good practice in the involvement of lead users would be to ascertain the advantages and the value created to the user. (Enkel et al., 2005)

In the case studied by Enkel (2005), users were only involved when a prototype was already quasi finished. This resulted in customers not having enough technological expertise that would enable them to contribute to the concept development in technical terms. Also, the fact that the company only sought lead users in their own customer base resulted in them not being able to use information from analogous fields. (Enkel et al., 2005)

Lettl (2007) argues that one of the most important market capabilities for firms willing to innovate is the competence to involve the *right* users at the *right* time in the *right* form. Based on this argument a framework for user involvement competence is proposed, where a dimension called the subject dimension deals with the users' characteristics and their competence. The second dimension called the interaction dimension has to do with the appropriate interaction patterns. In Lettl's (2007) framework, these dimensions are put into context with regard to the phase in which users are involved (see Figure 11).

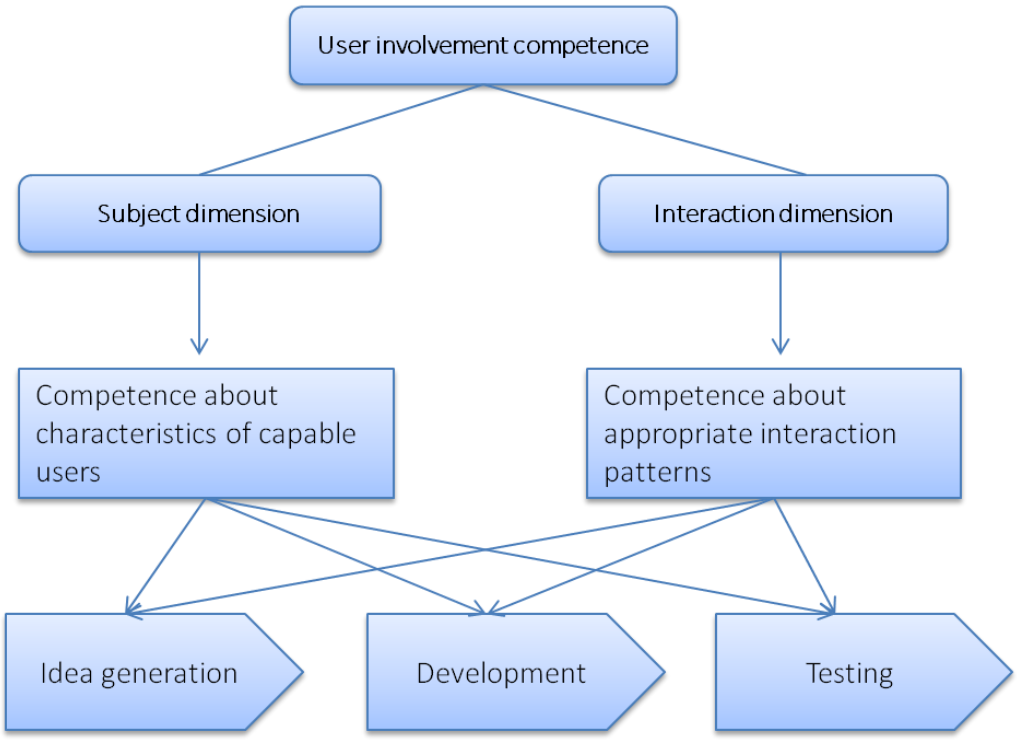

Figure 11 - Conceptual framework for user involvement competence (Lettl, 2007)

There exist several methods that address the subject dimension, one of the most prominent being the lead-user method (von Hippel, 1988). The interaction dimension has to do more with the needed *bridging strategies*, which provide insights to the level of personal interaction, the number of users to be involved, the time frame in which users should be involved, and the networking abilities of the employees participating in the user involvement team. Lettl's (2007) research suggests that face-to-face interaction should be the involvement technique, as manufacturers can then more easily develop an understanding about complex information about users. Also, Lettl (2007) proposes that an increased number of users provide better insights, and that the personnel coordinating the user involvement should have good social and professional skills.

2.5.2 Previous studies on lead-user involvement

Olson and Bakke (2001) studied lead-user involvement at a high technology firm and found that from the company's perspective, the technique was considered burdensome but effective. Involving users in the new product development process increased cross-functional conversation and clarified user requirements. However, in a follow-up interview with the company it was revealed that the method would not be re-applied because of the additional time needed to find lead users – instead, traditional focus groups would be arranged for the purpose of interacting with

users. An important factor leading to this was that the key people involved in the lead-user quest the first time had left the company and therefore no commitment to the method existed in the company anymore. Also, it never became clear to more general crowds within the company where the improvement ideas had been generated. This resulted in ambiguity towards the lead-user method. (Olson and Bakke, 2001)

Lüthje's and Herstatt's (2004) study on lead-user identification only deals briefly with user involvement. The writers note that the issue of Intellectual Property Rights needs to be addressed before involvement. Some users may not be as collaborative as others in giving out their ideas for companies' use, and others may not see the utility in being involved in someone else's product development. Also, the choice of the method of involvement should be discussed before implementation. The choice between individual involvement and workshops where lead users are brought together is not trivial. Workshops require human and financial resources, and groups do not always perform better than individuals. Also, the researching team has already gathered substantial information about lead users' experiences and ideas, and they already might be very knowledgeable on the research topic even without workshops. (Lüthje and Herstatt, 2004)

Piller and Walcher (2006) present a case study, where the involvement technique is to ask a group of (competing) users to submit solutions to a given task within a predetermined timeframe. They provide users with toolkits for idea competitions (TIC), and submissions are evaluated by an expert panel (ibid.). The highest scoring ideas receive an award from the manufacturer (ibid.). User toolkits have been suggested as a solution to the problem of users' information being often obscure and difficult to transfer, which is often called *sticky information* (von Hippel, 2001). In practice, the toolkit in Piller and Walcher's (2006) case was an online portal where users could submit ideas regarding a specific set of products. According to the authors, winning such a competition should indicate lead userness, and therefore the authors suggest that such an idea competition could be a measure for self-selection of lead users (Piller and Walcher, 2006). Compared to other lead-user identification methods, TIC simultaneously contributes innovative ideas and thus proves the real capability of users immediately (ibid.).

Ernst, Brem and Voigt (2013) suggest that social media could be a tool for integrating lead users into product development. The authors discuss the importance of tackling the not-invented-here (NIH) syndrome, the challenge of employees rejecting users' ideas just because of their origin outside the firm. They suggest that web 2.0 tools such as social media could contribute to overcoming this problem in the involvement of lead users. The choice of different media (wikis, blogs,

social networks, microblogs) differs with regard to the stage of the process and therefore the kind of tasks to be pursued. (Ernst et al., 2013)

One of the reasons why social media suits the involvement of lead users well is because social media applications are available outside the company and can be easily used by lead users without installing specific software. This makes the involvement process lean and very cost-efficient. Content creation is easy and lead users can even network amongst one another, as well as with the employees of the company. However, the common perception of social media tools being suitable for private use only has to be tackled. The potential harms of letting people use private accounts during working hours have to be considered. Also, the risks concerning uncontrollable processing of content and the control to spread content have to be managed. Therefore, the security risks regarding the transfer of sensitive information are the biggest of all risks to consider. A certain amount of trust is needed for a proactive corporate culture for knowledge sharing, and thereby the successful integration of the lead-user method. (Ernst et al., 2013)

2.5.3 Summarizing existing literature on user involvement

The involvement of users in general has been studied to a much larger extent than theory regarding lead users' involvement. Every article that concerns purely lead-user involvement states that the field has to be studied further (Ernst et al., 2013; Lüthje and Herstatt, 2004; Olson and Bakke, 2001; Piller and Walcher, 2006). Also, the methods of involvement in each of the articles presented in the lead user context differ from one another, sometimes significantly, so clear conclusions are not easily drawn.

Based on existing studies, one can conclude that the best practices presented for the involvement of lead users are more comprehensive when lead users are regarded merely as a best practice. The interest in lead users stems from the idea that not all users are able to provide valuable ideas, but lead user characteristics often predict product success. An interdisciplinary team where people combine their competences and provide different views is a widely recognized best practice in user involvement. In general, lead users are seen as a valuable source of product ideas, especially because of their innovative capabilities. Regarding the stage of involvement, continuous involvement from the earliest to the last phases of the product development process is often suggested.

2.6 Motivating lead users to participate in product or service development

As it seems rather clear why firms might want to use their customers' or users' knowledge in their product development processes, the important question is why users would choose to give out their knowledge and participate in the innovation process. The existing literature remains inconclusive about what would be the best practices in motivating rare and valuable lead users in companies' new product development processes. Also, even though the benefits for firms can be clearly articulated, it should be noted that motivation not only at the firm but at the individual level is required in order for a user involvement project to succeed.

In this section, an overview in motivation theory is first presented. Then, the motivation of users is reviewed after which the motivation of lead users is discussed. Last, the motivation required from firm personnel is discussed.

2.6.1 About user motivation

To be motivated towards a task means that one *is moved* to do something (Ryan and Deci, 2000). When motivated, people feel energized and activated toward a goal. People can have different levels, and different orientations of motivation. The level of motivation is related to the amount of motivation, whereas the orientation concerns more the underlying attitudes and goals – e.g. curiosity, interest or procurement of approval. The orientation of motivation can be divided into two main categories:

- *Intrinsic motivation*, which refers to doing something because it is interesting or enjoyable in itself, and
- *Extrinsic motivation*, which refers to doing something in order to fulfill a separable goal. (Ryan and Deci, 2000)

Kristensson et al. (2004) discuss the importance of both extrinsic and intrinsic motivation. In their research in the telecom industry, they state that some users might be motivated extrinsically by e.g. giving them a phone to use for free, and others intrinsically by getting the opportunity to share their ideas and perhaps influence the services of tomorrow (Kristensson et al., 2004).

Brockhoff (2003) also stresses the importance of creating incentives that reward both extrinsic and intrinsic motives. He introduces a number of possible rewards:

- Reimbursements reflecting the value of the suggestions
- Price reductions on a limited number of future new products

- Early access to future new products, which may generate higher returns or lower production costs
- Extra services during use of the new product (e.g. extended warranties, repair work, availability of help lines)
- Private or public honorable mentioning of being the originator of a product, which may impress a users' peer group
- Proving creativity to the individual concerned (Brockhoff, 2003).

In addition to these possible rewards, the option to give the innovating user some rights to the innovation has been discussed in literature (e.g. Enkel et al., 2005; Mumford, 2000). For example, Enkel et al. (2005) stress that some users may demand exclusive rights for the usage of the new product for a certain period of time to ascertain its competitive advantages. Mumford's (2000) research pointed out giving out patent rights to the innovation as one alternative for rewarding.

An important notion from Mumford (2000) is that as the commercial success of the created products and services cannot be taken for granted, recognizing progress made and not only success in terms of the bottom-line is important. For example, even if a marketable product does not become a success, successful completion of the development project should be recognized (Mumford, 2000). Contributions to the "bottom-line" could be recognized by incentives such as profit sharing, bonuses, stock options, or as mentioned above, sharing patent rights (ibid.). The danger in providing monetary or other compensating rewards is that some people may be attracted to offer ideas only because of the reward, and in the worst case these would not even represent the profile nor the wants of potential customers (Brockhoff, 2003). This could then reduce the quality of the ideas, since they would no longer be need-based but rather developed with only the reward in mind (ibid.). When more than one user is involved, the rewards should be equal to all participants (ibid.).

Not only rewards but also the conditions of work have to be optimal so that users are able to participate effectively. An important factor affecting the ability of working efficiently is the clarity of tasks at hand (e.g. Brockhoff, 2003; Damodaran, 1996; Ives and Olson, 1984). By studying user involvement in IT projects Damodaran (1996) found that users were often unclear about what their involvement required. This lead to confusion about their brief and concerns about their lack of expertise in computing, which clearly hindered the possibilities to contribute efficiently (ibid.). Brockhoff (2003) also points out the importance of clarifying the user's role in the product development process. In order to tackle this, the stage and level of expected co-operation should be defined prior to starting the project (ibid.).

2.6.2 Motivating lead users

User motivation of lead users differs from that of users whose motivation was discussed above. Jeppesen and Frederiksen (2006) study the motivation of innovative users who participate in product development efforts. Their research indicates that such innovative users exhibit lead user attributes. Because the majority of innovation occurring by involving users in companies' product development processes is the result of voluntary and uncompensated participation, innovation activity in this context relies heavily on intrinsic motivations. This notion can partly explain how most user innovation has taken place by hobbyists and not professional users, and therefore lead users are not necessarily customers of the firm developing the product. (Jeppesen and Frederiksen, 2006)

The literature concerning the rewarding of lead users is much more limited than literature about the rewarding of users in general. This might be because part of the definition of a lead user states that the user is positioned so that a solution to the problem in question will give them high benefits (e.g. Franke et al., 2006; von Hippel, 1988). The fact that lead users expect high benefits has been found to increase their motivation to participate to the problem-solving (e.g. Franke et al., 2006; Lüthje, 2004). The user will thus invest time and effort in exchange to a value created by the solution in return (Franke et al., 2006). The value of the innovation for the user has been found to affect the motivation to co-operate significantly (Enkel et al., 2005). Also Lettl et al. (2006) discuss the intrinsic motivation of innovative users and state that they can be motivated from the process of solving problems, the possibility to use innovation capabilities and openness to new technologies. Also Bogers (2010) discusses the motivation arising from the process of problem solving, which is often what makes people contribute to e.g. the development of open-source software.

Another driver of motivation, in addition to the value created to the user from the innovation, is recognition from the company. The satisfaction of needs that are not attended to is thus not enough, but the company has to put efforts into recognizing the users' efforts (Jeppesen and Frederiksen, 2006). The company should also try to enhance the *sense of autonomy* and *feeling of competence* of users because these can enhance intrinsic motivation (Jeppesen and Frederiksen, 2006; Ryan and Deci, 2000). The intellectual property rights (IPR) of the products being developed have been discussed more thoroughly in literature about users in general, but also Lüthje and Herstatt (2004) stress that IPR issues should be resolved before the commencement of the lead user involvement project.

2.6.3 Motivating people inside the company to commit to user involvement

Many studies have stressed the importance of the team conducting the process of user involvement (Alam, 2002; Enkel et al., 2005; Lüthje and Herstatt, 2004; Matthing et al., 2004; Pitta and Franzak, 1997). The cross-functionality and thereby the combination of interdisciplinary perspectives is an important building block for an effective team (e.g. Alam, 2002; Pitta and Franzak, 1997). Mumford (2000) has even argued that the creation of a team whose members are capable of creating conceptually creative thought and are skillful in combining concepts may be one of the simplest and most effective human resources strategies for enhancing innovation.

In order to benefit from the positive and innovative effects of interdisciplinary teams, ensuring their commitment to the user involvement project is a key issue. In Olson and Bakke's (2001) study the fast turnover of people lead to a lack of commitment towards the lead-user method, which despite its success, was discontinued because it was seen as burdensome. In order to tackle these challenges, the authors suggested some practices that might help in making the lead-user method a permanent part of the new product development process. One of these would be assigning a corporate board to oversee product proposals before they are implemented. The board would require user input before giving permission to continue product development. While this could be a way to make sure users are actually heard, it would increase bureaucracy and therefore might be rejected by some employees. Another possible method that might be more effective could be incorporating some results-based incentives that would reflect the change in the new product development process. This way those that could feel burdened by the tasks related to implementing the lead-user method, would perhaps think of those tasks as more desirable. Also, training of subordinates to ensure the continuity of the lead-user process, even if staff turnover is high, is very important. Following up on the process a number of months after the lead-user method has been implemented is also something that could be valuable. (Olson and Bakke, 2001)

2.7 The context of flexible and collaborative work

The empirical context in this thesis is one of flexible and collaborative work. This section will define the concepts of flexible work and collaborative work, and provide an outlook on the development and current state of the field.

Flexible work is defined as "working arrangements which allow employees to vary the amount, timing or location of their work" (de Menezes and Kelliher, 2011 p.

453). These sorts of arrangements often include the possibility to work remotely from the workplace, at times differing from the standard hours of the workplace, and also often offer the possibility to reduce the amount of time one is connected to work. Arrangements can either occur in a formally planned way, but the definition also includes more ad hoc and unplanned situations. (de Menezes and Kelliher, 2011)

Collaborative work is essentially about people working in teams. Individuals exchange considerable and complex information among one another, and do this in order to reach both individual and team goals. Both tacit and explicit knowledge is transferred, so that people are aware of task related content and also about the underlying roles and responsibilities relating to those tasks. (Churchill and Snowdon, 1998)

The discussions about flexible and collaborative work have gained more and more momentum in recent years, as the contents of work have been recognized to be under big change (Lönnblad and Vartiainen, 2012). Computer-based communication technology is developing in an ever increasing pace and changing how people work (Lönnblad and Vartiainen, 2012; Sproull and Kiesler, 1992). New ways of working, such as mobile, multi-locational, remote, flexible, distributed, and virtual work – are becoming more and more common, and organizations are facing the situation where most of knowledge work is no longer done in offices and team members can be situated all over the world (Lönnblad and Vartiainen, 2012). In the past two years, the pace in which firms are deciding to adopt flexible working arrangements has been increasing (Ouye, 2013), and conversations about the work practices in many Silicon Valley companies, which are generally thought as leading-edge firms in new work practices (e.g. Yahoo, HP) have been getting lots of media coverage (e.g. Business Insider, 2013; CNN, 2013; Forbes, 2013). The context has therefore become prominent for not only academics and facilities management professionals, but the collaborative nature of work is bringing the context also to human resources management's radar (Ouye, 2013). This makes the research context in this thesis a very interdisciplinary one, as not only the context is relevant to professionals in different fields, but also the methods used are combining multiple disciplines.

2.8 Concluding remarks

The identification of lead-users seems to be more studied than the involvement or motivation of lead users. However, the involvement and motivation of lead-users once found doesn't seem to be a trivial task. Figure 3 introduced in section 2.1.2.1 shows how scattered the user involvement literature is: not only are the product

development processes mostly different, the suggestions as to in which stage to involve users are also inconclusive. Not enough research about the best methods of involvement was found, but it seems as though an interdisciplinary team, whose commitment to the project is reassured by results-based incentives would work best from the company's perspective. Users could then be motivated intrinsically by giving them a possibility to solve problems in their domain of expertise; while making sure their involvement is both recognized as honorary mentions as well as possible rights or other upside to the potential success of the product being developed. The empirical context of flexible and collaborative work is a new area of study in the lead user literature and involves interdisciplinary perspectives.

3 Methods

This chapter introduces the research methodology used for this thesis, and shows how the method has guided data collection, analysis and the conclusions to be drawn. The two research questions of this thesis are the following ones:

1) how to identify lead users in the field of flexible and collaborative work, and
2) how to best involve and motivate lead users in the product development process of both consulting services and software development in the field of flexible and collaborative work

The empirical part of this study aims at answering the first of these two questions, whereas the conclusions about the second question are based on the literature review above. The chosen empirical method is Mountaineering, which was one of the introduced methods in section 2.4.

3.1 Research method description

Mountaineering is a combining method that flexibly uses many methods in parallel, and uses a lead userness self-assessment as an evaluation method for finding out whether a user is indeed a lead user or not (Mäkinen et al., 2013). The self-assessments are a means of measuring the lead user's knowledge with respect to the trend in question, and they were first developed by Franke et al. (2006) and further elaborated by Stockström et al. (2012). The self-assessments are described more thoroughly in section 3.2.2.

The Mountaineering method can be seen as an abductive method with an approach identifiable as systematic combining (Dubois and Gadde, 2002). Systematic combining along with other abductive methods were developed because case research was seen to have many problems with the generalization of results (ibid.). The case study is a research strategy that aims at "understanding the dynamics present within single settings", providing both quantitative and qualitative evidence (Eisenhardt, 1989 p. 534). Systematic combining is defined as a "nonlinear, path-dependent process of combining efforts with the ultimate object of matching theory and reality" (Dubois and Gadde, 2002 p. 556). Methods that use systematic combining go back and forth between framework, data sources, and analysis (Dubois and Gadde, 2002). As a result of this sequential movement, the case evolving during a study can be regarded as a *tool* as well as a *product*. It is suggested that going back and forth from one type of research activity to another and between empirical observations and theory expands the researchers' understanding of both theory and empirical phenomena. The approach is particularly useful for

development of novel theories (Dubois and Gadde, 2002), which makes it interesting to evaluate the Mountaineering approach presented by Mäkinen et al. (2013) in the ongoing year.

The method of Mountaineering was chosen because of the quality of results it has previously been able to provide and because of its unique feature where the researcher's own acumen defines the direction in which the research should go. By using the Mountaineering method, no choice between all the presented lead-user identification methods had to be made, as the idea is to combine and use all of these sequentially (Mäkinen et al., 2013). Simultaneously to being able to utilize the most applicable method for each point in time in the research, the method of Mountaineering can be assessed for its appropriateness in a new context, one of flexible and collaborative work. The method has previously been tested in very different fields: web services for teachers, solar panels, wood pellets, and solar thermal collectors (Mäkinen et al., 2013).

The process of Mountaineering is very similar to the one of pyramiding, where one moves step by step from a lead (i.e. for example a person, organization or event) to another in order to finally reach to the top lead users (Mäkinen et al., 2013). The difference to pyramiding is in the choice of means from which the researcher can select the most appropriate one to the situation at hand (ibid.). Also, pyramiding presupposes that all leads are people, but in reality there are many intermediary leads such as solutions, organizations, events, media etc. directing the researcher to more leading-edge information (ibid.) Since the researcher wanted to take advantage of multiple starting points and the possibility to alter the identification as the research proceeds, the choice of method was rather easy to make. Table 2 shows the categorization of lead types into ten different alternatives, and the appropriate methods to make use of those leads.

Table 2 - Lead types and applicable methods (Mäkinen et al., 2013)

LEAD TYPES	METHODS
Person An individual with a name	Snowball and pyramid sampling
Organization Formal organization (e.g. company, agency, non-profit, school)	Screening, Broadcasting, Other sampling methods, Investigating user solutions and investments, Miscellaneous encounters
Event Conference, seminar, fair, etc.	
Location Meeting place where people hang out	
Media Mass-media (newspaper, TV, radio, company website) excluding CMC (below)	
Computer-Mediated Communication (CMC) Interactive computer media (e.g. blog, forum, wiki, mailing list, social networking site, chat, online community)	
Solution User innovations, prototypes, etc.	
Field Professional field or domain (e.g. superconductors, banking, public health care)	
Index Searchable index of things, people and their personal information (e.g. census, health care records, tax records, databases, search engines)	
Personal network Personal network of the person conducting the search (e.g. colleagues, friends, family)	

Mäkinen et al. (2013) propose a number of best practices in the use of Mountaineering. A variety of different starting points will help in covering a wide area of networks. Starting early with broadcasting is recommended, because getting answers takes time. Starting early with the process is sensible also because the research process in itself is an excellent educator. Internet forums can help in identifying relevant discussion topics, and finding users with the most popular posts and then interviewing them could be useful. Working in parallel with different research methods is recommended, because it is hard to predict when a selected method will provide answers. A self-assessment of lead userness (see more in section 3.2.2) has to be well-elaborated and thought through precisely, and adding proxy questions to these self-assessments (e.g. "whose example did you follow, or where did you find your model?") will help in figuring out the inventive part. The

trend definitions should be iterated along the way, because the research process will guide the researcher towards more accurate trends. The researcher should be open to iterating continuously, and to accepting input from intermediaries, experts, gatekeepers or people that do not seem to be lead users initially. These people could open doors to analogous fields or to divergent thinking. (Mäkinen et al., 2013)

3.2 Data collection and analysis

3.2.1 First steps in the research

The gathering of empirical material in the Mountaineering method has many starting points. The following steps illustrate how the research started:

1) Identifying trends related to the project context, and setting up relevant statements
2) Developing a self-assessment about lead userness
3) Developing an interview routine
4) Starting off with broadcasting on LinkedIn, a professional online social network that has discussion groups in fields relating to the trend
5) Searching for other internet forums that maintain conversations about the trends identified
6) Interviewing colleagues at Rapal and testing the self-assessment questions
7) Utilizing the researcher's own social networks to find relevant contacts
8) Snowball and pyramid sampling potential lead users
9) Iterating the trends identified

The trends were developed in collaboration with Rapal Oy's staff, so that their strategic importance could be ascertained. In total, the research had six different starting points with the first ones happening in early May and the last one in early July 2013. Two of the first starting points were personal networks of the researcher: personal friends and work colleagues. Two other starting points were computer mediated communications: sampling LinkedIn for relevant discussion groups and reading an email reached via a mailing list. The two latter ones were an event for users of Rapal Oy's products, and media, namely a customer magazine of an indoor decorator. In total, the research process took four months, starting in early May and ending in early September 2013. Throughout the research process, every step was written down in an Excel spreadsheet with the date and time of interaction, lead type, name of lead, method used, and leads as collected data. This enabled the researcher to see who suggested contacting whom, thereby forming links between leads.

3.2.2 Lead userness self-assessments

In order to determine whether a user is a lead user or not, each user that was interviewed had to answer to self-assessment questions. The self-assessment of lead userness is based on research by Franke et al. (2006) and later modified by Stockström et al. (2012). From the self-assessment questions first developed by Franke et al. (2006), Stockström et al. (2012) chose the ones with the highest Item-to-Total correlation, and Mäkinen et al. (2013) followed this example. Four characteristics, *Ahead of a Trend*, *Technical Expertise*, *High Benefit Expected*, and *Community Based Resources* are used to indicate lead userness.

The trends regarding flexible and collaborative work were divided into four categories, and in each category, four statements about the lead userness characteristics mentioned above were developed. The development of these categories started by the researcher talking to her instructors about the possible trends relating to flexible and collaborative work. A brainstorming session later, a categorization of four trends was established. These trends were then presented to senior staff at Rapal and their format was discussed, and iterations to the wordings made. The four categories developed were the following:

1) *Best practices and solutions that support flexible and collaborative work* (e.g. a Monday morning meeting with the whole team present face-to-face)
2) *Measuring and analyzing flexible and collaborative work* (i.e. something that could replace the traditional timecard)
3) *Planning and design of physical spaces for facilitating flexible and collaborative work* (e.g. the choice of office furniture or space design)
4) *Utilizing and managing physical spaces for flexible and collaborative work* (e.g. a meeting room booking system that can accommodate to the needs of teams that work sequentially from home or from the office)

The statements (see Appendix 1 for English versions and Appendix 2 for Finnish translations) were assessed by users on a seven-point Likert scale. Table 3 presents the statements in the first of four categories introduced above.

Table 3 - Lead userness questions regarding best practices and solutions that support flexible and collaborative work, measured on a seven-point Likert scale

Lead-user characteristic	Question
Ahead of a Trend	*I have improved or created practices or solutions that support flexible and collaborative work*
Technical Expertise	*I can develop practices or make technical changes to solutions that support flexible and collaborative work*
High Benefit Expected	*I have already had problems with flexible and collaborative work that could not be solved with conventional offerings available on the market*
Community-Based Resources	*I know many other people who have improved or created practices or solutions that support flexible and collaborative work*

These statements were never sent out via an online survey or by email, but the researcher always read these out loud to the user, who then gave themselves a score. The statements were translated into Finnish, the native language of the researcher, so that interviews could be held in the most appropriate language. Five interviews were held in English and 17 in Finnish.

Regarding the wording of the statements, sometimes users found it hard to understand what was meant with solutions or practices. Therefore the researcher was always ready to elaborate, in case the user seemed to ponder too long or if they asked directly for more guidance. Telling everyone the whole reasoning behind the research might have been confusing, so when telling about the scope of the research, it was often only said that the researcher was looking for people that are ahead of a trend in terms of flexible and collaborative work. In case the interviewee showed more interest towards the questions – because many told they were very different from others they had been asked previously – the scope of the research was opened to a further extent. Also regarding the wording, the negation (problems that could *not* be solved by conventional offerings) in the third statement sometimes was not understood correctly. The negation caused many interviewees to be confused about the score they should give themselves, and often first gave themselves the opposite of the intended score. In case the researcher saw that the score did not reflect the discussion before or after giving a score, she explained the meaning of the statement to a further extent.

Another thing regarding the wording of the statements was the use of the word "technical", which was removed prior to conducting interviews from the third category of physical spaces because of the potential misunderstandings it could cause (see Appendix 1 for detailed wordings). It was noted by the researcher already

in the beginning of the process that some users might be intimidated by the word "technical", as the context of flexible and collaborative work involves much more than technical solutions. In case this seemed to bother the interviewee, the researcher noted that it is not expected that technical ability means the ability to e.g. program, but to solve problems within the category individually.

3.2.3 User interviews

The first lead-user snowball sampling interviews happened in late June, and the last ones in early September. As presented in section 2.4.1, the idea in snowball sampling is to ask people whom they would ask for help in the subject matter, or who would be more knowledgeable in the topic. In total, 22 users were interviewed. In order to get an interview, users were sent an email presenting the scope of the study and why the researcher had interest in their experiences. Often, the name of the person referring the potential lead user was mentioned. Most of the users were interviewed face-to-face (15 users), but the international location forced some interviews to be done by phone (5) and via Skype (2). All interviews were recorded in order to be able to go back to users' responses. Table 4 presents the profiles for the 22 interviewed users. In a broad categorization, there are in total five different user categories. Users 1, 3, 4, 5, and 14 form the first group of consultants, either in management consulting or in workplace consulting. Users 6, 7, 12, 15, and 20 form the second group of researchers, either at Finnish or US- based universities, or in other state-owned research institutes. Professional facilities managers (FM), workplace managers (WM) or corporate real estate managers (CREM) are the third user group formed by users 2, 10, 16, 17, 18, 21 and 22. The fourth user group is co-working space managers, formed by users 8, 9, 11, and 13. The last and fifth user group of HR professionals only constitutes of one member, user 19.

Table 4 – Background information and profiles of interviewed users

User	Title	Organization	Country	User category
1	Consultant	Own management consultancy	Finland	Consultants
2	Workplace manager	University	Finland	FM & WM & CREM
3	CEO	Own workplace consultancy	Finland	Consultants
4	Consultant	Workplace consultancy	Finland	Consultants
5	Consultant	Own management consultancy	Finland	Consultants
6	Researcher	University	Finland	Researchers
7	Researcher	University Properties	Finland	Researchers
8	Co-founder	Co-working space	United States	Co-working space managers
9	CEO	Co-working space	Finland	Co-working space managers
10	Facilities Manager	Game and entertainment	Finland	FM & WM & CREM
11	Head	Co-working space	Finland	Co-working space managers
12	Senior Lecturer	University	United States	Researchers
13	COO	Co-working space	United States	Co-working space managers
14	Consultant	Own management consultancy	Finland	Consultants
15	Researcher	University	Finland	Researchers
16	Head of Corporate Real Estate	Telecom Operator	Finland	FM & WM & CREM
17	Head of Corporate Real Estate	Telecommunications	Finland	FM & WM & CREM
18	Facilities Manager	Professional Services	Finland	FM & WM & CREM
19	Talent Management Director	Bio Forest Industry	Finland	HR Professionals
20	Researcher	State-owned research institute	Finland	Researchers
21	Head of Innovation (FM & CRE)	Banking	United Kingdom	FM & WM & CREM
22	Head of Workplace	Broadcasting	United Kingdom	FM & WM & CREM

The categorization was only done after the interviews had been conducted in order to gain more insights as to which sort of background would indicate more lead userness. Results could be thus compared both more generally, and by user groups. In summarizing the scores, the average score is used as a representative figure of the average knowledge within the category. The standard deviation of responses indicates how dispersed the scores are from their average, with a low figure indicating that scores are rather similar and a high figure that people have given very different scores.

3.3 The empirical context

Rapal Oy is a software firm providing real-time information for owners, constructors and users of premises and infrastructure about the financial and environmental effects of their premises. Rapal's software products aim at providing help for better decision-making about facilities and the built environment. The company was established in 1991 and is owned by its personnel. Rapal's net sales in 2012 were of approximately €5.7 million. (Rapal Oy, 2013a)

In early 2013, the company acquired Co3 Group, a U.S.-based company specialized in work environment development. The Pattern Book, Co3's main product, helps organizations improve workplace productivity and reduce workplace infrastructure costs. With the added resources in workplace development, Rapal aims at becoming the best expert in sustainable work and living environment. (Rapal Oy, 2013b)

The empirical context of flexible and collaborative work was explained further in section 2.7. A short definition of the concepts of flexible and collaborative work were presented to all users before they were interviewed.

3.3.1 Personal networks of the researcher

A way of getting initial contacts and leads were the researcher's own personal networks. The method of Mountaineering (Mäkinen et al., 2013) allows the researcher to not only make decisions about the direction in which he or she wishes to take the research, but also to make use of own networks and snowball sample people in these. Two of the first starting points in this case were ones that made use of the researcher's personal networks. In order to add to the repeatability and transparency of the research, the researcher and her networks utilized in this research are now described.

The researcher is a 24-year-old female from Helsinki, Finland who has studied Information Networks and knowledge intensive business at Aalto University, a leading Finnish university. Her main areas of study have had to do with strategic management and work psychology, which make the context of flexible work rather easily approachable. She has work experience in the finance industry, management consulting and in the IT sector. Her current employer, Rapal Oy, has provided the researcher with a vast amount of contacts in the facilities management profession. One part of her personal networks has emerged through previous and current work contacts, and peers from university, and the other from her family background: a family of musicians and academics. She has been very active in the discussions about female leadership and has co-founded a network for career-oriented academic women, where she has gotten acquainted with a large range of people in various business functions – mostly females of her own age. The women's professional network has been a natural place to talk to friends about the research, and actually the first starting point in the research happened while eating brunch with a fellow member of the network, a 30-year-old female working in the IT industry as a marketing manager. The researcher is fairly active in social media, and has over 430 connections in LinkedIn and over 770 friends on Facebook. Her role in the research has been one of an empathic participant and observer: she has communicated her own understandings about the research topic to the research participants, and developed shared understandings and meanings with participants (LeCompte and Schensul, 2010).

3.3.2 Identification research process

The research started by first sampling the researcher's personal networks: colleagues and friends. Talking to colleagues about the assignment at hand was fairly natural, and the colleagues' network provided the researcher with a vast amount of leads. In addition to getting acquainted with personal networks' contacts, miscellaneous encounters formed another way for finding leads. Miscellaneous encounters happened by reading an email sent through the researcher's university mailing list, and by browsing a magazine in the office coffee room. A more planned way of acquiring more leads was broadcasting on LinkedIn, which was started already early on because of the potential delay in responses. The researcher's post got attention in one LinkedIn group called "Workplace Evolutionaries", where the discussion was labeled "Discussion of the Week" by the group manager. The group consists of 2638 members and is open for anyone that has a profile on LinkedIn. In total 12 people were engaged in the discussion, and three users were recommended. All of these responded positively to the interview request, but only two of these could be interviewed within the research's timeframe. Browsing through contacts

and their updates on LinkedIn also brought one user (user 12) directly to the researcher's attention.

After these first efforts, the research concentrated on snowball and pyramid sampling users. The lead userness self-assessment questionnaire (see Appendix 1 and 2 for detailed assessment questions) made it possible to locate innovative users with vast knowledge about flexible and collaborative work. Broadcasting did not provide any more leads than the ones gotten through the "Workplace Evolutionaries" group or by simple broadcasting on LinkedIn, although the progress in each group where a conversation had been started was followed up until the end. Snowball and pyramid sampling continued until the end of the process, and lead the researcher to many leads, out of which many were not sampled because of their large amount.

In all, 28 interview requests were sent, out of which 22 agreed and were interviewed, two replied and no mutual time could be established within the period of two months, and four did not answer at all. Users from Finland, the United States and the United Kingdom were sampled. In addition to these leads, 137 other leads such as solutions, events, locations, organizations or not-contacted people, were a part of the research. It would have been too burdensome to follow up on each lead found, and therefore towards the end of the research, all of the leads acquired were not snowball sampled. The researcher decided to stop interviewing after the 22th user, because she thought the network of users had been searched thoroughly enough and many lead users with high scores in the lead-userness self-assessments had been found. Also, data started to saturate. Already at the sixth interview held, every lead suggested by the interviewed user had already been spotted in the research. Also in later interviews with users, many recommended to interview users that already had been interviewed, indicating that the network in the context of flexible and collaborative work is very cohesive and no national borders are known. For example, user 12, based in the US, suggested the researcher contact user 17, who is based in Finland. Also, user 22, a UK resident, suggested two of the same US-based users already found through the "Workplace Evolutionaries" LinkedIn discussion group.

The selection of lead users to be involved was done based on the results to self-assessment questions, the number of referrals given to a user, and by assessing the diversity of the group being formed. Since it was clear since the beginning that the first involvement practice would be holding a workshop where new concepts would be developed, the researcher tried to think of the right dynamics for the group as another determinant for user involvement. Section 4.4 explains in more detail how choices between different users were made, and why.

4 Results

This chapter presents the results reached through the Mountaineering research process. First, a description of the snowball sampling process is described after which the answers to self-assessment questions are presented. A network analysis of the research process will then follow, and the chapter concludes with a section about the selection of lead users.

4.1 Snowball and pyramid sampling

As described in chapter 3, in total 22 users were interviewed. In the interviews, the lead userness self-assessments were completed, and each user was snowball sampled, i.e. asked whom they would seek for help with regard to the context discussed in the self-assessments. Snowball sampling guided the research so that the researcher could follow the leads provided by users in the interviews, who hopefully were more and more knowledgeable in the topic. Also, links between users sampled could be formed.

Figure 12 below is an illustration of the research process and the various starting points as a function of time. It shows in stage of the research process the user interview of each user was conducted, and how the links between users were formed. The legend in Figure 13 explains the colors used for the leads and the sampling methods (see section 2.4 for descriptions of each method). All leads are not indicated in this picture because of their large number (159), but the network illustration in section 4.3 shows all of the leads in the research.

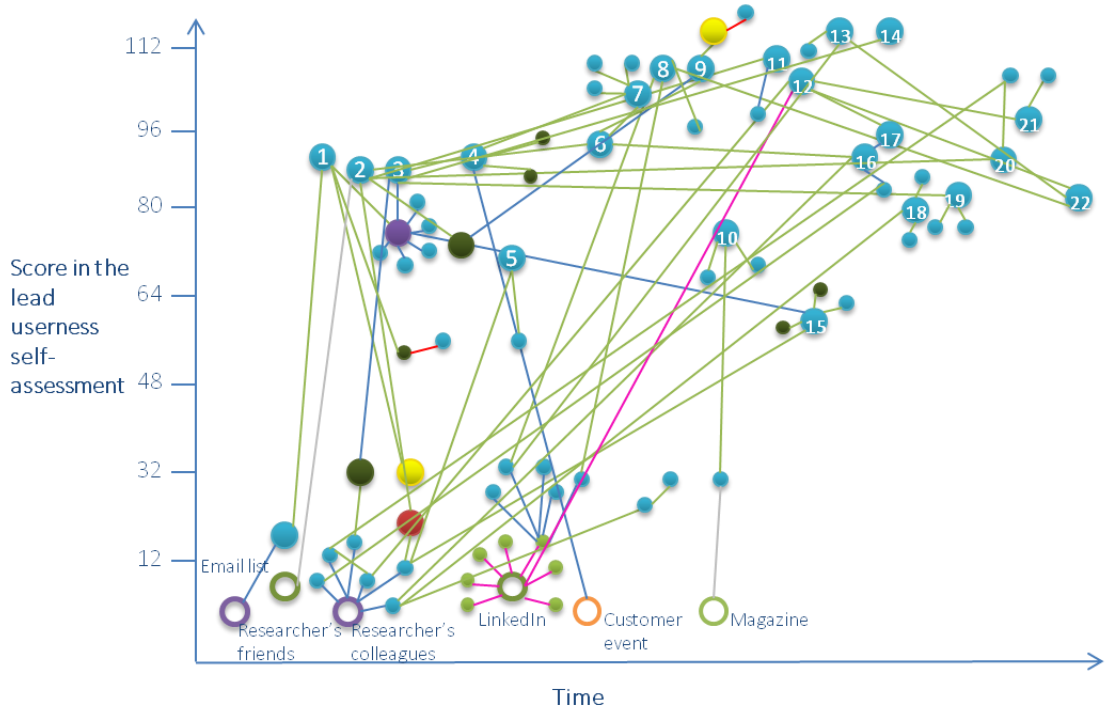

Figure 12 - Leads in the mountaineering process as a function of time

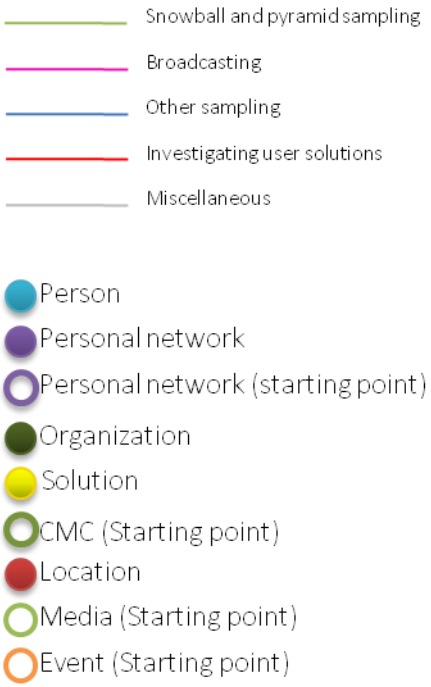

Figure 13 - Legend about methods and lead types used in the research

4.2 Lead-user self-assessment questions

The self-assessment questions, the format of which was presented in table 4 above, defined th form and scope of each user interview (see Appendices 1 and 2 for more detailed wordings). The following sections present results obtained from user interviews, where lead userness self-assessments were used as a basis for discussion, all the while providing the opportunity to rank the knowledge of interviewed users. Each category is presented, starting with *Best practices and solutions that support flexible and collaborative work*. The second category of *Measuring and analyzing flexible and collaborative work* comes next, after which the third category of *Planning and design of physical spaces for facilitating flexible and collaborative work* will be explored. The fourth category of *Utilizing and managing physical spaces for flexible and collaborative work* is the last of four trends identified in this research and its results will come last. The legend in Figure 14 explains the data points for the graphs to be presented for each category. Each user category (the categorization was presented in section 3.2.3) has a different data point color and shape. The red line indicates the maximum score per category, which is always of 28 points. All scores are shown in detail in Appendix 3.

Figure 14 - Legend for lead userness self-assessment score graphs

4.2.1 Best practices and solutions that support flexible and collaborative work

The first category, *Best practices and solutions that support flexible and collaborative work,* concentrated on the practices and solutions improved or created by potential lead users. Examples given to interviewees in case they seemed not to understand

the statements were shared disk space, and a weekly meeting with all team members present face to face. The four statements in this category were answered by all 22 interviewees, with five users (8, 11, 12, 13 and 14) scoring full 28 points in the category. Three of these users (8, 11 and 13) are co-working space managers and the other two represent different user groups. Figure 15 depicts the scores of interviewed users on a graph.

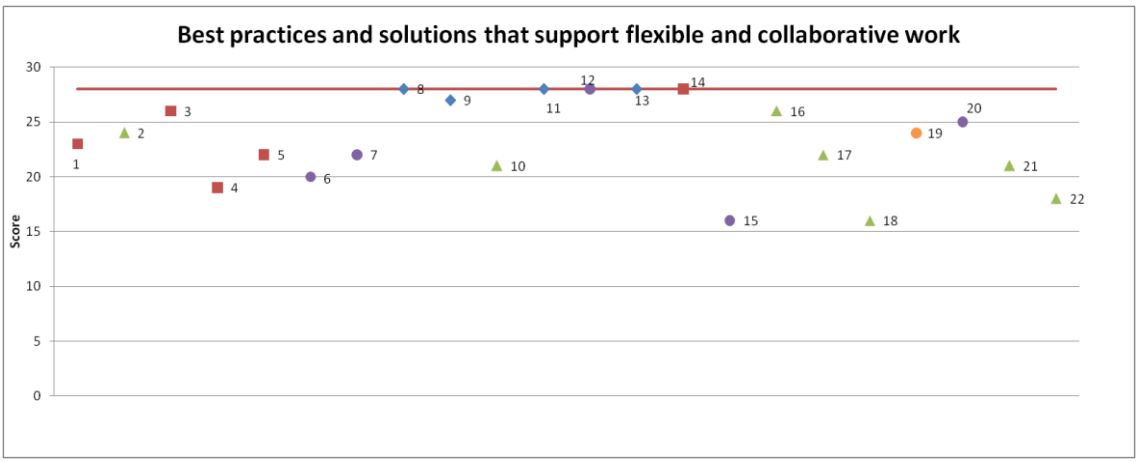

Figure 15 - Scores for self-assessment questions: Best practices and solutions that support flexible and collaborative work

The first self-assessment statement of being *Ahead of a Trend* was generally the one where everyone gave themselves rather high points, indicating that almost all users were familiar with the topic. . The average score for the first question was 6,50 points, and the standard deviation 0,74.

The second statement of *Technical Expertise* was generally answered more cautiously. The average score in this category was 6,05, and the range of answers was from 4 to 7 with a standard deviation of 1,05.

Out of the four statements in this category, the third one of *High Benefit Expected* was generally answered with lower points (average 4,27). Also, standard deviation of answers in this category was fairly high (2,37), and the answers ranged from 1 to 7. This indicates that there was no mutual agreement about whether current offerings on the market could solve users' problems relating to the practices and solutions supporting flexible and collaborative work. Some thought this was a big issue, and others thought all the offerings are available, but the problem is often in their use: people do not know which work practices would best support flexible and collaborative work. There was also disagreement regarding this statement by many lead users: users 17, 21 and 22 all thought that the offerings available were good

enough, whereas users 8, 9, and 12 thought that they had encountered significant problems in finding suitable offerings on the market.

The fourth question about *Community-Based Resources* was in general answered with fairly high points, with an average score of 6,45 and a standard deviation of 0,86. This means that the people interviewed viewed themselves being well networked within the context of practices and solutions supporting flexible and collaborative work. Table 5 illustrates the scores for all four self-assessment questions. Standard deviations are also indicated.

Table 5- Average scores and standard deviations for lead userness self-assessment questions: Best practices and solutions that support flexible and collaborative work (n=22)

	Total	Ahead of a Trend	Technical Expertise	High Benefit Expected	Community-Based Resources
Average	23,27	6,50	6,05	4,27	6,45
Standard deviation	3,92	0,74	1,05	2,37	0,86

When looking at the scores of each user group separately, it can be seen that co-working space managers and HR professionals were the most knowledgeable ones in this topic, which is also indicated by low standard deviation figures. It must be noted that the HR professionals group is only represented by one user, which makes its standard deviation incomparable to others. Out of all five user groups, facilities, workplace and corporate real estate managers got the lowest average score and the researchers group had most deviating answers. The high standard deviation for researchers could be explained by the differing research topics represented in the same user group. The low average score of facilities, workplace and corporate real estate managers could have arisen because of their focus to the management of spaces rather than people, which is the opposite for HR professionals. Table 6 shows the average scores and standard deviations of scores per user group.

Table 6 - Average scores and standard deviations per user group: Best practices and solutions that support flexible and collaborative work

User group	Average of scores	Standard deviation of scores
Consultants (n=5)	23,60	3,51
Co-working space managers (n=4)	27,75	0,50
FM & WM & CREM (n=7)	21,14	3,39
Researchers (n=5)	22,20	4,60
HR Professionals (n=1)	24,00	0,00

4.2.2 Measuring and analyzing flexible and collaborative work

The second category of measuring and analyzing flexible and collaborative work was also tested with the same format for lead-user self-assessments. The four lead-user characteristics assessed were again *Ahead of a Trend*, *Technical Expertise*, *High Benefit Expected*, and *Community-Based Resources*. Users were asked about their experiences in improving or creating solutions that help measure or analyze flexible and collaborative work. The examples given in this category were any kind of solutions that would help in getting rid of the traditional timecard, or some sort of productivity analyses. Figure 16 illustrates the total scores (maximum 28 points) of all interviewed users.

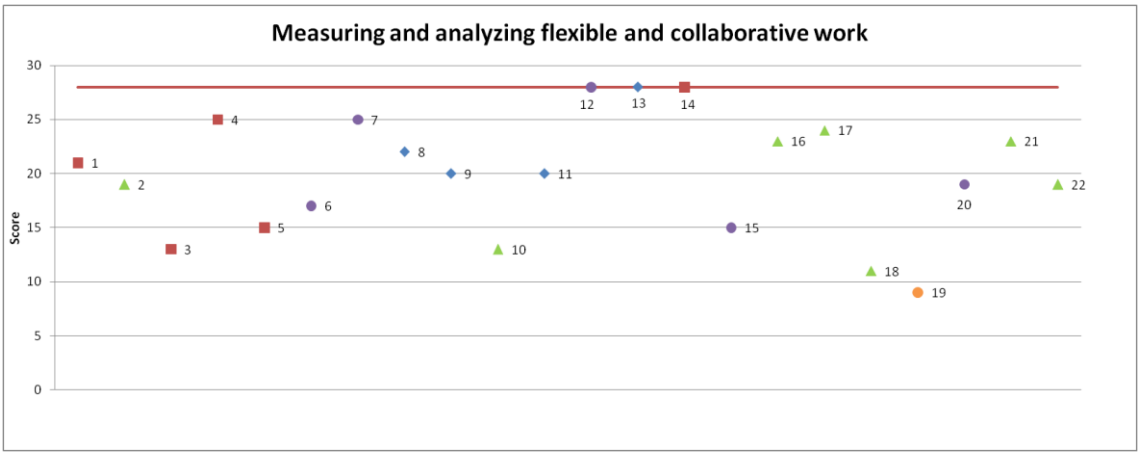

Figure 16 - Scores for self-assessment questions: Measuring and analyzing flexible and collaborative work

Three out of 22 respondents scored full 28 points in this category, and all of these users (12, 13 and 14) come from different professional backgrounds, and all are considered as lead users. Users scored themselves very differently with regard to the first statement of *Ahead of a Trend* – scores ranged from 1 to 7, with a standard deviation of 2,07 and an average score of 5,00. The most usual response for the first

question was that users did not consider themselves as experts in the domain, as the whole topic of analyzing and measuring flexible and collaborative work is a new one with only a few attempts to tackle the issue. However, lead users (e.g. users 8, 9, 12, 13, 14, 17) scored themselves all points of 6 or above (maximum 7), which indicates that lead users were in fact knowledgeable on the topic.

The second statement of *Technical Expertise* was generally answered with low points. For example, user 22 scored himself 1 point out of 7, because he thought that he had not been forced to do anything technical. Other lead users scored themselves much higher points for this statement.

The third statement of *High Benefit Expected* which claimed there are no offerings available on the market that would solve measurement and analysis problems in flexible and collaborative work was very much agreed to. Out of the people who did not see this as an issue, one lead user's (22) reasoning was that their attempts to tackle the issue had been so successful that there no longer was a problem with available offerings as these were not needed. The user had implemented a productivity measurement system in their organization that according to the user was the first of its kind and therefore considered as sensitive information within the organization. Two users (users 10 and 18) considered that measurement at the physical space level (e.g. space usage measurements) was enough information. The average score for the third statement of *High Benefit Expected* was 6,05 and the standard deviation 1,62.

The fourth statement *Community-Based Resources* was in general given a very low score – many lead users (e.g. 8, 9, 16 and 22) scored themselves below 4 points in this category. However, the same user (22) who thought to have tackled the issue felt he knew many people who had measured or analyzed flexible and collaborative work. The average score for the fourth statement was 4,18 and the standard deviation 2,13. Table 7 below summarizes the average scores and standard deviations for the measurement and analysis of flexible and collaborative work. The overall average score, as well as statement-specific averages and deviations, are listed.

Table 7- Average scores and standard deviations for lead userness self-assessment questions: Measuring and analyzing flexible and collaborative work (n=22)

	Total	Ahead of a Trend	Technical Expertise	High Benefit Expected	Community-Based Resources
Average	19,86	5,00	4,64	6,05	4,18
Standard deviation	5,53	2,07	2,08	1,62	2,13

When looking at the scores per user group, again the co-working group managers are the ones with the highest scores and therefore abilities in this category. Researchers and consultants come next with nearly as high average scores in the category. In all of the user groups, scores deviate largely, which is an indicator of varying responses and thereby abilities within user groups. Facilities, workplace and corporate real estate managers also showed rather deviating scores and a relatively low average score. Out of all user groups, HR professionals show the lowest scores, which means that the user representing this group (19) did not think of themselves as being very knowledgeable about the measurement and analysis of flexible and collaborative work. Table 8 below shows the figures per user group.

Table 8 - Average scores and standard deviations per user group: Measuring and analyzing flexible and collaborative work

User group	Average of scores	Standard deviation of scores
Consultants (n=5)	20,40	6,39
Co-working space managers (n=4)	22,50	3,79
FM & WM & CREM (n=7)	18,86	5,11
Researchers (n=5)	20,80	5,50
HR Professionals (n=1)	9,00	0,00

4.2.3 Planning and design of physical spaces for facilitating flexible and collaborative work

The third category of physical spaces was generally rather familiar to all users interviewed. Users were again presented self-assessment questions in the same format as before. The questions in the third category aimed at finding out users' experiences in improving or creating physical work spaces that support flexible and collaborative work. In case users found it hard to understand what was meant with this, they were given an example about e.g. the right choice of office furniture to best support flexible work. Four users (9, 11, 13 and 14) out of the 22 interviewed scored themselves full points in this category. Three of these users are co-working space managers (9, 11 and 13), and one (14) a consultant. Figure 17 depicts the scores of the self-assessment questions for the third category of planning and design of physical spaces for facilitating flexible and collaborative work.

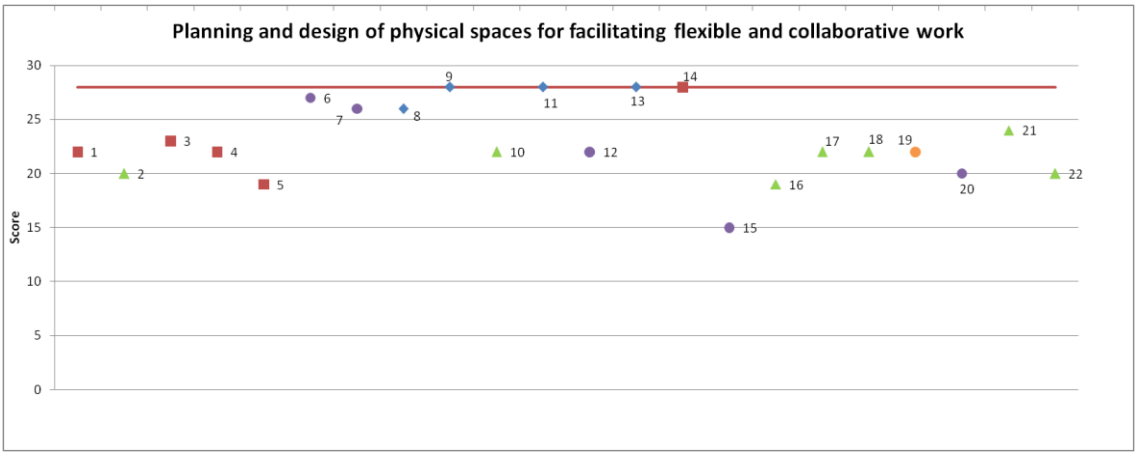

Figure 17 - Scores for self-assessment questions: Planning and design of physical spaces for facilitating flexible and collaborative work

The first statement of *Ahead of a Trend* was answered with the highest scores (average score 6,68) with regard to any other statement even by non-lead users. The scores deviated from 2 to 7 (standard deviation 1,09), with only one user giving themselves a lower score than 6.

The second question of *Technical Expertise* was changed to not include the word "technical" because it would guide the user to believe he or she would be expected to be able to e.g. build furniture, which was not what was meant with the statement. Instead, users were asked whether they are able to make changes to physical spaces that would support flexible and collaborative work. The average score for this question was 6,45 with a standard deviation of 0,91 and scores ranging from 4 to 7.

The third question of *High Benefit Expected* was among the ones with most differing opinions: the scores deviated from 1 to 7, with a standard deviation of 2,45 – the highest standard deviation out of all statements. Some lead users (12, 16, 17, 21 and 22) considered that there was no problem in terms of the offerings available for creating physical places to support flexible and collaborative work – instead, it was thought that people failed to make use of these offerings in the most appropriate way. The fact that people do not really understand the true nature of flexible work makes them think more about ergonomic or wall color issues rather than the nature of work being performed in the physical space. It should be noted that all co-working space managers recognized there were problems in finding the right kind of offerings for their collaborative spaces. For example, the right kind of phone booths was named an issue.

For the fourth statement of *Community-Based Resources*, all users scored very high: the average was 6,09 and answers ranged from 4 to 7 (standard deviation 1,06). These results indicate that all users had vast networks in terms of planning and

design of physical spaces. Table 9 summarizes the average scores and standard deviations both for the whole category, as well as for all four statements.

Table 9 - scores and standard deviations for lead userness self-assessment questions: Planning and design of physical spaces for facilitating flexible and collaborative work (n=22)

	Total	Ahead of a Trend	Technical Expertise	High Benefit Expected	Community-Based Resources
Average	22,95	6,68	6,45	3,73	6,09
Standard deviation	3,55	1,09	0,91	2,45	1,06

The user group- specific average scores and standard deviations show that co-working space managers are most knowledgeable about the development of physical spaces for flexible and collaborative work. Their average is only 0,5 points away from the maximum score and scores deviate only to a small extent. This result does make sense as the work performed in co-working spaces is in its nature flexible and collaborative. Since the users interviewed had almost all of them been founding the spaces they now manage, they most probably have had to think of creating most appropriate physical spaces for their future users. Members also in other user groups saw that co-working spaces were at a leading-edge compared to others in the creation of physical spaces for flexible and collaborative work. Since these spaces have not had to comply to some larger organizations' budget and rules, they have been capable of creating spaces that their work truly requires. The need for such spaces was generally thought to increase, because knowledge work is changing traditional employee-employer roles. It is now often the employee who has the upper hand because it is their knowledge that is being applied to promote company goals. Employees therefore more often than before choose to work as freelancers or as entrepreneurs rather than work solely for a bigger company.

Regarding the user group average scores, consultants have the second highest average score in this category. However, consultants' scores deviate quite much, indicating that there are both knowledgeable and not so knowledgeable users within the group. Workplace consultants (3, 4) felt especially capable in this topic, but some management consultants (1, 5) thought they would know where to look for help, but not solve the problems themselves. Researchers and HR professionals received a mean just below the average of all responses (see table 9). Also within the user group of researchers, scores deviate to a large extent. The lowest score in this category is the one received by facilities, workplace management and corporate real estate management professionals. Their scores do not deviate very much.

Table 10 - Average scores and standard deviations per user group: Planning and design of physical spaces for facilitating flexible and collaborative work

User group	Average of scores	Standard deviation of scores
Consultants (n=5)	22,80	3,27
Co-working space managers (n=4)	27,50	1,00
FM & WM & CREM (n=7)	21,29	1,70
Researchers (n=5)	22,00	4,85
HR Professionals (n=1)	22,00	0,00

4.2.4 Utilizing and managing physical spaces for flexible and collaborative work

The statements regarding the fourth category aimed at finding out whether users had improved or created solutions that support utilizing or managing physical spaces for flexible and collaborative work. The format of lead userness self-assessment questions was again the same in the fourth and last category. In case users didn't understand what was meant with space utilization and management in this context, an example about a new meeting room booking system that would take into account how many participants would participate remotely and how many face-to-face was presented. Four (4, 12, 13 and 14) out of all 22 users received a full score in this category. Users 4 and 14 represent the user category of consultants, and users 12 and 13 are parts of different user groups. User 4 is the only one not considered as lead user out of these people – as a workplace consultant, a more knowledgeable user (9) could be identified. More information about the selection of lead users will follow in section 4.4. Figure 18 shows the scores users gave themselves in the fourth category of utilizing and managing physical spaces for flexible and collaborative work.

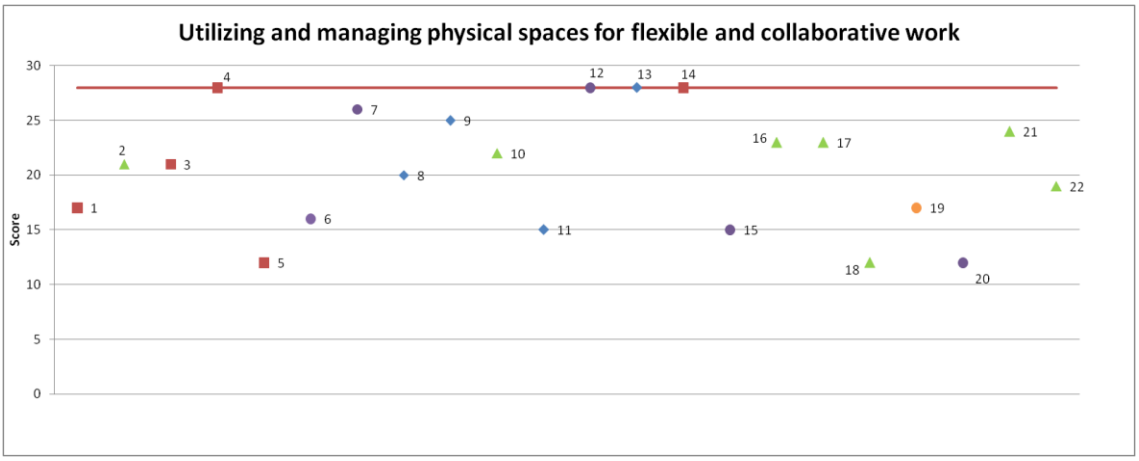

Figure 18 - Scores for self-assessment questions: Utilizing and managing physical spaces for flexible and collaborative work

Scores for self-assessment questions: Utilizing and managing physical spaces for flexible and collaborative work

The last category received much more polarized responses compared to the third category also regarding physical spaces. One lead user (13) thought that space utilization is irrelevant, if work productivity can be increased. She however ranked high in the self-assessments because she thought performance measurement was a good practice for managing physical spaces, since essentially spaces are all about people. Other lead users thought that today's technology about e.g. motion sensors and CO2-smellers could be utilized in a much more advanced way, so that more accurate data about space utilization and thereby management could be obtained (16, 17).

The first statement of *Ahead of a Trend* got scores ranging from 1 to 7, with an average score of 5,77 and a standard deviation of 1,77. The first statement was generally scored with high points by lead users, except for user 20, a psychologist that did not think of herself as being competent with regard to the trend.

Responses were rather polarized also in the *Technical Expertise*-dimension, with scores again ranging from 1 to 7, with the standard deviation being 2,10 and the average score 5,05. In this dimension, two lead users (20 and 22) scored themselves lower than 4 points, because they thought they would not be able to implement such utilization or management systems by themselves.

The third question about *High Benefit Expected* received an average score of 5,00 and a standard deviation of 2,14. All lead users except user 22 thought that offerings available had not solved problems related to utilization and management of spaces. User 22's innovation for performance management also consisted of a component

for the utilization of spaces, but he did not want to share more information about his invention because of its sensitive nature. One user (19) refused to score herself in this dimension, because she felt she did not have the needed competences to assess the current offerings on the market. . Responses therefore ranged from 0 to 7.

The fourth question of *Community-Based Resources* revealed that people in general thought that either there was not many people considered experts in utilization and management of physical spaces for flexible and collaborative work, or that they simply did not know these people if they did exist. The average score in the fourth dimension was 4,95 and the scores had a standard deviation of 1,94. All lead users except user 16 considered themselves networked regarding the trend of utilizing and managing spaces for flexible and collaborative work. This user thought that there were not enough people doing quality work in the domain, at least to his knowledge. Table 11 shows the scores and standard deviations in this category.

Table 11- scores and standard deviations for lead userness self-assessment questions: Utilizing and managing physical spaces for flexible and collaborative work (n=22)

	Total	Ahead of a Trend	Technical Expertise	High Benefit Expected	Community-Based Resources
Average	20,55	5,77	5,05	5,00	4,95
Standard deviation	5,47	1,77	2,10	2,14	1,94

Co-working space managers received the highest scores in this category. Their scores however diverge quite much. The next highest average score is one of consultants, out of which two gave themselves the highest possible score. As others in the user category have lower scores, the scores show a fairly high standard deviation. Facilities, workplace and corporate real estate managers have the next highest average score, which is just above the overall average of all users (see table 11 above). Here the deviation of scores is also lower than the overall standard deviation, which indicates that scores given by users in this user group are rather close to one another. Researchers and HR professionals show the lowest figures in this category, but the researchers' high standard deviation indicates there are significant differences among different users' scores within the category. Table 12 shows the scores discussed above.

Table 12 - Average scores and standard deviations per user group: Utilizing and managing spaces for flexible and collaborative work

User group	Average of scores	Standard deviation of scores
Consultants (n=5)	21,20	6,98
Co-working space managers (n=4)	22,00	5,72
FM & WM & CREM (n=7)	20,57	4,12
Researchers (n=5)	19,40	7,13
HR Professionals (n=1)	17,00	0,00

4.3 Network analysis

As the links between leads could be established with the help of the documentation of the identification process, a visualization of the network of leads in the research could be formed (see figure 20). The legend in Figure 19 presents the lead types used in the research and the corresponding colors in the graph. Starting points are empty circles, whereas other leads are filled. As presented in chapter 3, the starting points for the research were:

- Researcher's friends (personal network)
- Researcher's colleagues (personal network)
- Sampling in LinkedIn for relevant discussion groups (Computer-mediated communications)
- Email received through a mailing list (Computer-mediated communications)
- Customer event for Rapal Oy's customers (Event)
- Customer magazine of an indoor decorator (Media)

The network analysis was made with Node XL, an open-source Excel add-in (The Social Media Research Foundation, 2013). The algorithm used for drawing the graph is the Harel-Koren Fast Multiscale, which is designed to draw large algorithms very quickly and in a simple visual way (Harel and Koren, 2001). The algorithm is force-directed, which means that all edges (lines) are about the same length and designed visually so that as few edges as possible would cross one another (Pierce, 2010).

The graph shows that lead users and other leads are very connected – the network of visionaries in flexible and collaborative work seems to be very cohesive. Already in the sixth interview, all leads suggested when snowball sampling the user, were leads that already had been involved in the research. Later on, though, new leads were found. It was interesting to note that the leads encountered via computer-

mediated communications such as LinkedIn were also referred by other users that were snowball sampled, and found through an entirely different starting point.

Figure 19 - Legend of leads used in graph network

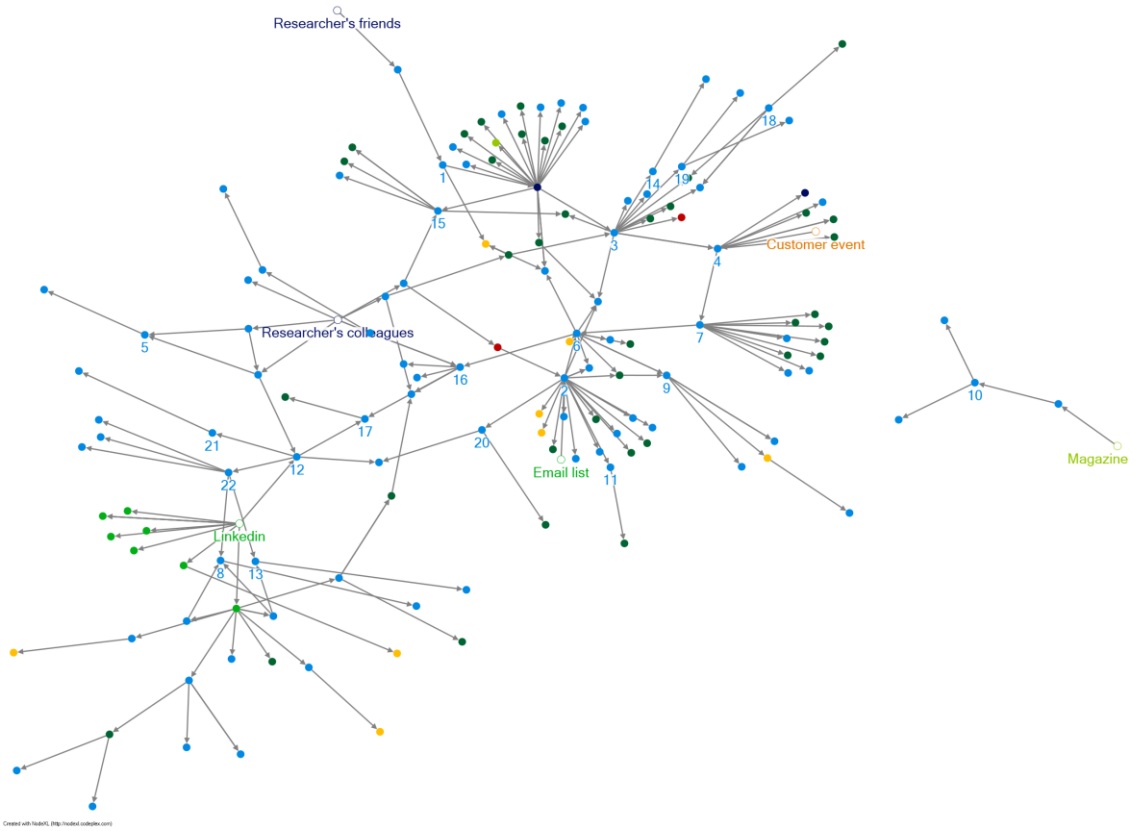

Figure 20 - Graph visualization of leads in the research

4.4 Selection of lead users

The selection of lead users in the Mäkinen et al. (2013) study was done by selecting the users with the highest scores in the lead userness self-assessments. Another indicator for lead userness was the number of referrals in the research process (ibid.). As there are four trends indicating lead userness in this research, the selection of lead users is not straight-forward. The following table summarizes users' scores in the lead userness self-assessments, and shows the number of referrals in the research process. User 8, a co-working space manager based in the United States received the highest amount of referrals. Ten users out of the 22 interviewed only had one referral, and 11 users had two referrals. The highest scores in the whole research were ones of users 13 and 14, the former being a US-based co-working space manager and the latter a Finnish consultant. User 13 was referred to by two users, who had been found through different starting points in the research. User 14 was referred to by another consultant (user 3) based in Finland. Table 13 shows the scores per category per user (maximum score 28), as well as total points (maximum score 112) and the number of referrals. Whenever the user has reached the maximum score, the score is bolded.

Table 13 - User scores per category and number of referrals

User	1. Best practices and solutions that support flexible and collaborative work	2. Measuring and analyzing flexible and collaborative work	3. Planning and design of physical spaces for facilitating flexible and collaborative work	4. Utilizing and managing physical spaces for flexible and collaborative work	Total	Referrals
1	23	21	22	22	88	1
2	24	19	20	20	83	2
3	26	13	23	23	85	2
4	19	25	22	22	88	2
5	22	15	19	19	75	1
6	20	17	27	27	91	2
7	22	25	26	26	99	1
8	**28**	22	26	26	102	3
9	27	20	**28**	**28**	103	2
10	21	13	22	22	78	1
11	**28**	20	**28**	**28**	104	2
12	**28**	**28**	22	22	100	2
13	**28**	**28**	**28**	**28**	**112**	2
14	**28**	**28**	**28**	**28**	**112**	1
15	16	15	15	15	61	2
16	26	23	19	19	87	2
17	22	24	22	22	90	2
18	16	11	22	22	71	1
19	24	9	22	22	77	1
20	25	19	20	20	84	1
21	21	23	24	24	92	1
22	18	19	20	20	77	1

The lead userness of users 13 and 14 is accentuated also in Figure 21. Figure 21 shows users' overall total scores in the four categories (maximum score 112). By looking at the scores of co-working space managers in general (users 8, 9, 11 and 13), it can be seen how their scores are fairly high at all times. Consultants' scores (users 1, 3, 4, 5 and 14) deviate much more from one another than the ones of co-working space managers'. Scores for facilities management, workplace management and corporate real estate management professionals (users 2, 10, 16, 17, 18, 21, 22) do not seem to be very close to one another either, nor do the scores for researchers (users 6, 7, 12, 15, 20).

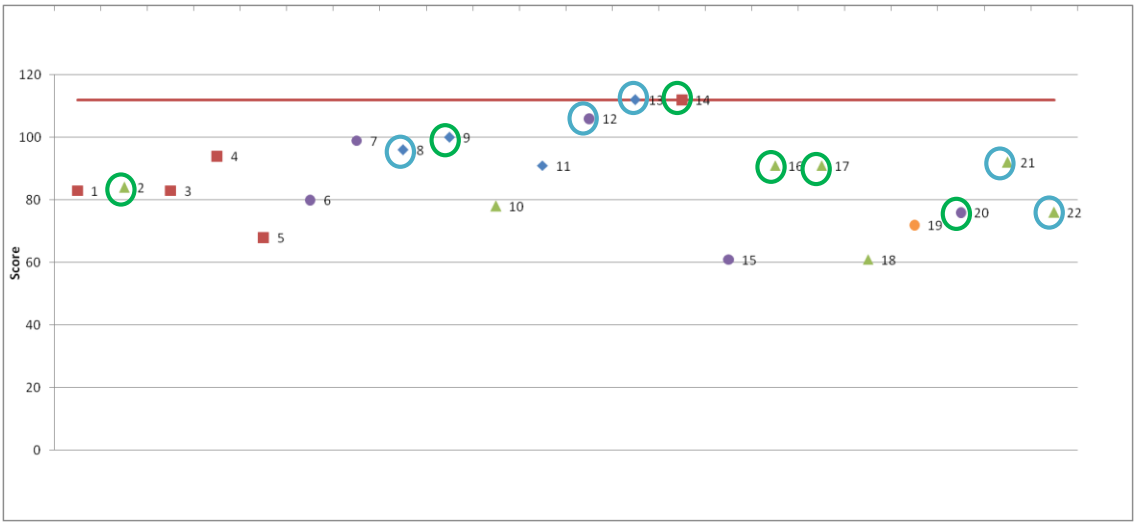

Figure 21 - Overall scores (maximum 112 points) for users interviewed

The final selection of lead users to be involved at Rapal Oy had to be made not only based on the lead userness assessment scores and number of referrals, but also based on the physical location of users. It was determined that the company would have no resources to fly in people from e.g. the United States to Finland, and therefore the highest-scoring and most referred to users in Finland were selected to attend workshops, which will be arranged in December 2013. Also diversity in the backgrounds of users was sought. For example, because another co-working space manager (user 9) was taken as a part of the group, user 11 with a relatively high score (104) and two referrals was left out. User 9 also had vast experience as a workplace consultant, which lead to leaving user 4 out. Also, user 14 was seen to already represent the consultant category, which spoke again for leaving user 4 out. The researcher also made the choice of involving only one researcher, user 20 instead of user 7, based on user 20's interesting background as a work psychologist. User 7, although a researcher, had spent most of his career in the corporate real estate function of a major Finnish company, which made his overall profile very similar to those of corporate real estate professionals. The green circles indicate the lead users selected for the use of Rapal Oy. Blue circles indicate the international users that would have been involved, had there not been any budget or time restrictions.

4.4.1 Lead user profiles

The following section illustrates first the profiles for the six lead user profiles of users found in Finland, and who now will be involved in Rapal Oy's product development. As users from the United States and from the United Kingdom had to be left out, but regardless were considered lead users, the profiles for five international lead users will also be presented.

User 2, workplace manager, Finland

User 2 used to work for the Finnish state properties, where she was pioneering the shift into flexible working arrangements. User 2 proved particularly well network within the industry, and many referrals to other lead users came from her.

User 9, Co-working space manager, Finland

User 9 is a workplace consultant who was frequently travelling and visiting customers in the capital area of Helsinki. He was often faced with the problem of having a few hours to work between two meetings, but no space in a good location where one could really concentrate. Cafeterias did not always have working Wi-Fi and there were often no tables left. The user then founded a co-working space with a few key locations in Helsinki city center and the airport, so that busy professionals can pop in whenever they wish and be charged by the minute.

User 14, consultant, Finland

As former communications director in an IT company, user 14 built an "Office of the Future" already in 1988. Researchers from all over the world would come and take a look at the office where people had no assigned seats, and had desktops connected to a central computer with a similar logic to cloud computing nowadays. 300 of the 500 employees would also have desktops at home, so remote working at flexible times was made possible. User 14 has written many articles about the office and also taken part in the space's development. He has retired, but occasionally works as a consultant.

User 16, Head of Corporate Real Estate, Finland

User 16 heads the corporate real estate function at a telecommunications company in Finland. He is very active in the discussion towards more flexible working arrangements, and from the 2000's onwards has piloted new arrangements for offices in his portfolio.

User 17, Head of Corporate Real Estate, Finland

A long career in corporate real estate and a portfolio of real estate in over 200 countries has forced user 17 to think of the future of work. Heading the corporate real estate function of one of the largest Finnish international companies, the user has co-developed a utilization measurement system that draws each user based on their location picked up from mobile phone signals and draws users on the ground plan.

User 20, specialized researcher, Finland

User 20 has a background in university research of virtual and flexible work. She has a Ph. D. in psychology and has studied especially the behavior and wellbeing of people when they work in flexible and collaborative work environments. She looks at the problems related to flexible work from a different angle compared to many real estate professionals, and often finds herself in conferences where she is the only one not working in the CRE function of firms.

User 8, Co-working space manager, United States

User 8 is a former web service development freelancer, who found it hard to concentrate without other people working alongside him. Since teaming up with a couple of other freelancers, user 8 has co-founded one of the biggest and most renowned co-working spaces in Philadelphia.

User 12, Researcher, United States

User 12 is a renowned retired lecturer from a prominent US university who has developed the concept of agile work, which is about creating offices suitable for knowledge work that are prepared to continuously alter based on the space users' wishes. All users referred by user 12 asked how the researcher could get in hold of the busy man, because he has nowadays tried to stay out of interviews.

User 13, Co-working space manager, United States

User 13 is the chief operating officer of one of the largest co-working space chains in the US. She has been developing productivity measurement questionnaires for their space users, and is very well networked internationally within the topic of flexible and collaborative work.

User 21, Head of Innovation, United Kingdom

User 21 has worked from home ever since the early 1990's and has developed a functioning productivity measurement system for the use of his workplace, which is one of the biggest European banks.

User 22, Head of Workplace, United Kingdom

User 22 is a partly retired corporate real estate professional, who is also the former head of corporate real estate in a British firm in the media industry. He has been in charge of many of the biggest workplace development projects in the United Kingdom, and has pioneered working environments to better suit the needs of their users.

5 Discussion

Different lead-user identification methods have usually been tested for innovations in technological domains, and this research has aimed at exploring different identification, involvement and motivation practices for lead users in a new domain of social innovations. Answers to the following research questions have been sought:

1. How to identify lead users in the field of flexible and collaborative work
2. How to best involve and motivate lead users in the product development process of both consulting services and software development in the field flexible and collaborative work

The empirical part of this thesis has concentrated on the identification of lead users in flexible and collaborative work, and at the end of the process, such users could be successfully identified. In order to identify lead users and answer to the first research question, the method of Mountaineering (Mäkinen et al., 2013) was used, and its viability tested in the context of flexible and collaborative work. The second research question was answered based on literature, and an understanding about the current state of how lead users are involved and motivated to participate in product development could be established.

This Chapter is organized in the following way: first, the implications of the study with regard to the two research questions will be presented. Implications for the identification of lead users are first presented, after which the involvement and motivation of lead users is discussed. A number of practical implications for firms willing to involve lead users in their product development presented. Thereafter, an evaluation of the study will be presented and future research topics suggested.

5.1 Theoretical implications

This section first brings together insights about the involvement of lead users based on both literature and the empirical research presented above. The viability of the Mountaineering method is assessed and the strengths of the research with regard to previous ones are considered. Thereafter, the involvement and motivation of lead users is discussed based on the literature presented in Chapter 2. A list of recommended practices in the involvement and motivation of lead users is given.

5.1.1 Identification of lead users

The research in this thesis implies that the Mountaineering method (Mäkinen et al., 2013) is suitable for identifying lead users in social innovations. The choice of

context is interesting as the majority of lead-user studies have been conducted in very technical contexts (see e.g. Table 1 for reference). The fact that lead users can be identified systematically within the context of social innovations makes sense as the definition of a lead user in itself does not comment on differences in the technical abilities of the user. However, much of the research has previously pointed out that technical abilities are a defining lead-user characteristic (e.g. Franke et al., 2006; Lüthje, 2004; Stockstrom et al., 2012). Researchers aiming at finding also users with less technical backgrounds should re-formulate the lead userness self-assessments so, that they do not intimidate users that could in fact be lead users but are simply not comfortable with the word "technical".

The fact that the research process succeeded in finding lead users in such a new context suggests that there would exist lead users whenever there is a future trend. Regardless of the context, it could thus be expected that there are lead users, experimenting new ways of coping with the trend and expecting high benefits from solving the problems related to the trend. For the sake of this research, lead users showed interest towards the mere fact that someone was researching their area of interest. All interviewed users asked to be sent the results of the thesis, which implies that users were interested in getting answers on how to solve problems relating to the trends studied.

The Mountaineering research method was found suitable for identifying lead users in this thesis. The relatively short period of time used to conduct the research would suggest that the method is also an efficient one. The efficiency of other lead-user identification methods was already pondered in sections 2.4.1 and 2.4.2. For example, Stockström et al. (2012) tested empirically the relative efficiency of pyramiding over screening and found that pyramiding becomes more efficient as the size of the social network to be searched increases. Since Mountaineering enables a larger set of methods and starting points to choose from than solely the method of pyramiding, it could be expected that Mountaineering is even more efficient than pyramiding in the identification of lead users. Mäkinen et al. (2013), however, comment on the efficiency of research by saying that the length of the chain of leads does not certainly imply a more laborious process. This is because it might as well happen that in a short chain, new leads are less easily found and therefore the research becomes just as laborious and time-consuming as in longer chains. More empirical studies about this topic are needed in order to draw clearer conclusions. It is interesting to note that the research process of Mountaineering can be conducted by a single person. In previous articles, lead user studies have usually been performed by a group of researchers (e.g. Franke et al., 2006; Lüthje and Herstatt, 2004; Mäkinen et al., 2013; Stockstrom et al., 2012). In fact, having only

one person to conduct the research probably adds trustworthiness to the research because the explanations given in interviews were exactly the same. Also, additional questions asked by users were probably answered in a more cohesive way.

The use of the Mountaineering method also enabled the researcher and the company in question, Rapal Oy, to expand their knowledge in the topic of flexible and collaborative work. Since the statements discussed with each user have to do with future trends and possible solutions to problems related to these, trends are inevitably discussed. The users interviewed can be regarded as rather visionary people and oftentimes fruitful conversations about future trends in flexible and collaborative work arose. Because the value of lead users is clear to Rapal Oy, the selected lead users (see section 4.4) will be involved in the product development of the firm. A workshop will be arranged, where new concepts in the context of flexible and collaborative work will be discussed.

5.1.2 Involving and motivating lead users

Regarding the involvement and motivation of lead users, the literature review in this thesis has showed how little focus has been given to lead users as opposed to other users. In some articles, using lead users instead of other users in providing insights for product development is seen as a best practice (see section 2.5.1). Other articles (see section 2.5.2), that are nevertheless much more rare, discuss the best involvement practices with the presupposition that these involved users are lead users. Whereas the articles about users regardless of their user profile contribute more to suggestions about timing of involvement as well as stage of involvement (e.g. Brockhoff, 2003; Enkel et al., 2005), articles with a clear focus on lead-user involvement suggest more innovative ways to involve users. For example, idea competitions held online are seen as a way to identify lead users simultaneously to being able to harness the best ideas from leading-edge users (Piller and Walcher, 2006). Ernst et al. (2013) suggest social media as a viable tool for involving lead users: with social media applications, the networking effects among users as well as company staff could be maximized and efficient sharing of knowledge enabled. The trouble related to all of these articles mentioned above is that they do not give very concrete recommendations about topics to discuss with users. Also, as so many online interaction modes are presented, no clear suggestions about the ratio of face-to-face interaction with regard to online interaction is suggested – it is often only stated that sharing tacit knowledge is extremely difficult if it does not happen face-to-face.

The motivation of users to participate in the product development efforts of the firm in question can be again assessed based on theory studied in the literature review.

Since lead-user quests are initiated by companies that seek outside knowledge, the notion by Brockhoff et al. (2003) about potentially higher expected rewards for participation for company-initiated projects is relevant. Companies willing to incorporate lead users in their product development efforts should therefore be prepared to reward lead users more significantly than they would reward other users participating in e.g. usability tests.

There is no clear consensus about the kind of rewards that lead users would expect for their participation efforts. Some argue that since lead users are by definition positioned so that they expect high rewards for solving the issue in question, they would not need any other incentive to participate than the intrinsic motivation arising from the opportunity to solve a previously unsolvable problem (e.g. Franke et al., 2006; Jeppesen and Frederiksen, 2006; Lüthje, 2004). However, if the company sees value in the ideas produced by lead users, they should at least make use of other drivers for intrinsic motivation, which do not require any cash resources or the like. Best practices to suggest to companies willing to motivate lead users are public recognition of the user's efforts and competence (Jeppesen and Frederiksen, 2006), and enhancing the user's sense of autonomy (Jeppesen and Frederiksen, 2006; Ryan and Deci, 2000). Also, motivating the staff responsible for the involvement project should be a priority for companies. Forming interdisciplinary teams with results-based incentives (e.g. part of future profits) is recommended (Olson and Bakke, 2001). Also, some sort of supervision board to foresee that no product ideas go to production before user insights are heard, was suggested to help in making user involvement an everyday task to complete (Olson and Bakke, 2001).

5.2 Limitations

In the Mountaineering method, the researcher uses different identification methods sequentially and makes iterative changes to the research strategy as the process moves forward (Mäkinen et al., 2013). As suggested by Mäkinen et al. (2013), broadcasting was the first research method used, and as stated in Chapter 3, this was done through a number of LinkedIn groups. It is however very possible that all relevant groups relating to flexible and collaborative work were not found, because LinkedIn group searches can only be done through finding a suitable group title or by looking at potential lead users' profiles and the groups they participate in. Other web forums were not used because suitable forums could not be found after a Google search.

The choice of people to be snowball sampled was essentially made by the researcher, which may have established some limitations. Because of this, it might

be that some relevant users might have gone unnoticed even though they would have been recommended by some other user. The fact that there was only a limited time to complete the research might have resulted in the earliest users found being overrepresented in the sample. However, since the whole purpose of the Mountaineering method is to make use of the researcher's own consideration (Mäkinen et al., 2013), this limitation was known to exist already in the beginning.

The researcher decided not to perform any statistical analysis, because the number of interviews (22) would have been rather low in order to draw any notable conclusions. Also, the averages and standard deviations of lead userness self-assessment scores provided enough data for a purposeful analysis. Since the aim in the empirical part was to identify lead users, and this was done successfully, no significant benefits would have been reached by performing an additional statistical analysis.

The wording in the lead userness self-assessment statements was chosen to be at a very intangible level, because this could give the interviewees space to think on their own. The trends chosen for research were reviewed by experts in the case company as well as the thesis supervisors, but this does not remove the possibility that the mere choice of words or trends have guided people to think in a certain way. Examples were given out only when the interviewee showed signs of not understanding the statement properly. Presenting examples certainly modified the way in which the interviewee understood the statement and therefore guided their response towards the direction which the examples showed.

The use of the word "technical" in the statements was often an issue, and as noted in Chapter 3, the researcher often pointed out that technical solutions did not always need to be engineering-related. This often helped in getting users to give themselves scores that would reflect the relevant abilities for the sake of this thesis and its target lead users. There also are potentially even big differences between people's willingness to rate themselves highly – some may feel that giving full 7 points is exaggerated and others are not ashamed to call themselves experts. Since the identification of lead users for this research did not know any national barriers, it might be that some answers might have been affected by cultural tendencies. It could be that Brits or Americans are more at ease with stating they are experts in an issue whereas Finns could be more cautious to promise too much of themselves.

Another wording issue was the negation in the third statement in each category. As noted in Chapter 3, the negation caused many to answer an opposite score to the one meant. To tackle this problem, it might be useful to re-formulate the third statement so that it does not include a negation. For example, the *Ahead of a Trend*

– statement for the first category could have been formulated in the following way: "I have been unsatisfied with conventional market offerings aimed at tackling issues relating to flexible and collaborative work".

5.3 Evaluation of the study

This section will evaluate the study based on the three criteria proposed by Stenius et al. (2008) for the evaluation of qualitative data. Those are: 1) significance of the data set and its social or cultural place, 2) sufficiency of the data, and coverage of the analysis, and 3) transparency and repeatability of the analysis (Stenius et al., 2008).

Regarding the first criterion, *significance of the data set*, this study has provided Rapal Oy with valuable networks and trend insights about flexible and collaborative work. The lead users will be involved in the company's future product development efforts, and therefore their emergence has changed the current product development process and thus corporate cultural scene in Rapal Oy. As already pointed out in section 5.2, the fact that the study did not make any difference between the cultural backgrounds of users might have had an impact on the results of the study. However, as it was found that the networks in the context of flexible and collaborative work are very international (as many users recommended foreign leads), and as many of the lead users found were based in countries outside of Finland, it strongly seems as the study has been able to identify lead users regardless of their cultural background. This finding in itself is very interesting and significant – it would seem as though the social and cultural place in the context of flexible and collaborative work does not know national or cultural boundaries, but is more guided by mutual interests and goals.

The study showed some saturation of data in the empirical research, which implies that the *sufficiency of data* – criterion can be met. The next steps in the research were always guided by the leads provided by interviewed users when they were snowball sampled. As noted previously in this research, already the sixth of the 22 interviews conducted showed saturation of data: all leads recommended by user 6 were already pointed out previously in the research process. The network figures in sections 4.1 and 4.3 also provide confirmation to the claim of there being clear connectedness in the data studied. The rather large sample of 22 interviewed users and 137 other leads involved in the research also speak for the criterion of *data coverage* to be met.

Following a systematic documentation process all throughout the research, where the time and date, identification method used, and lead type and lead name were written down improve the *transparency and repeatability of the analysis*. Also,

basing lead-user selection on a previously studied self-assessment format (Franke et al., 2006; Mäkinen et al., 2013; Stockstrom et al., 2012) improves transparency. However, not only data but also the researcher's acumen (as previously pointed out in the research) guided the next steps to take in the research. This could have lowered the transparency and repeatability of the research, but were prerequisites of the study being able to be conducted. Also, the personal networks of the researcher, which were valuable starting points, are in their nature not repeatable, but again necessary for the research to be achievable.

In all, the Mountaineering research approach enabled revealing the international nature of the network of inventive users in flexible and collaborative work. Especially snowball and pyramid sampling was a useful method in this research, as many users seemed to be well networked and also willing to help in the research. However, if one would have not accounted for intermediary leads (i.e. leads that are not people) much of the value of users' networks would have not been harnessed. The lead userness self-assessments in themselves were considered having personal touch by many users interviewed. Many became excited that someone was doing a research in their topic of interest and offered to be of help whenever needed. Also broadcasting provided the researcher with valuable leads: all of the three users found through LinkedIn are regarded as lead users. They were also all referred to more than once and received high scores in the lead userness self-assessments. The period of four months with a resource of one person was enough to generate a thorough view of innovations in flexible and collaborative work. Keeping eyes open to new possible starting points and leads truly paid off: as Mountaineering also accounts for miscellaneous encounters, two of the six starting points providing valuable leads could be incorporated in the research. For example, the last starting point, browsing through media, did not provide a lead user but an important contact with commercial attractiveness to Rapal Oy. This starting point was the only one that remained separate from the other starting points, which all connected at some stage in the research.

5.4 Practical implications

Based on the literature on involvement presented above, one could give a few recommendations to companies willing to involve and motivate users in their product development. The involvement of lead users has many variables: the timing, scope, stage, and mode of involvement all have to be thought out and the most according ones chosen for each involvement project. The following practices summarize what would seem as viable practices when planning user involvement projects. Some suggestions are drawn from theory, and others are based on empirical results of the study. The first suggestion has to do with the identification

of lead users, because having the right users is a precondition for a successful involvement project.

- Only start the lead user quest once you are happy with the trends that you have identified, and always be prepared to iterate
- In case you find more than five-six appropriate lead users, pick the ones you think might work best together, and who have networking opportunities among them (everyone does not know everyone)
- Form a team inside the company that constitutes of cross-functional people who are excited to contribute and committed to making the project succeed
- Inform selected lead users about the selection process in order to give them a sense of appreciation
- Organize a workshop and carefully plan the program
- A trend outlook based on the lead user interviews is a good opening for the workshop to be organized for lead users after those have been identified
- Engage lead users also in physical actions (e.g. paper prototyping, drawing visions or building things with Lego bricks) so that they can make their visions concrete
- Plan a continuous feedback loop with the involved lead users so that they get a feeling of partial contribution to the firm's future success
- Blog, and inform the community surrounding lead users about the findings in your workshops. This not only reinforces the company's brand as being one that is ahead of trends, but also reinforces the personal brands of lead users that have contributed, as being valued and knowledgeable, and committed to solving problems in the industry.

5.5 Future research

This section proposes future research topics that are needed. Since this thesis has concentrated on finding out whether the Mountaineering method is a viable lead-user identification method in social innovations, the usefulness of these lead users in the development of service and product concepts should be investigated. Also, getting more insights about what type of user should be involved in what stage of a product or service development process would be useful. Enkel et al. (2005) have begun this research process – Figure 6 in Chapter 2 further illustrates their research. More empirical work around these theoretic insights would be helpful in developing systematic user involvement strategies.

As noted in the limitations of this study in section 5.2, the cultural background of users might impact their preferences to answer a question in a given way. Also, it could be that trends in flexible and collaborative work do not move in the same pace

globally – but then again, it might be that these trends are generalizable globally. Especially since the context of this thesis has to do with social innovations and behavior of people, culture has very probably an effect on the practices in flexible and collaborative work. The impact of users' cultural background to their lead userness is a topic of interest that could be studied further in the future.

Also, it would be interesting to research whether lead users are helpful in the development of products that have been available for a long time rather than investigating the future of concepts or ideating wholly new products. The involvement of lead users compared to other users in for example the latter part of a product's time span would also be an interesting research topic. Comparative research about lead users opposed to other users e.g. opinion leaders, creative individuals, expert users, or randomly picked customers could also help in figuring out the true value behind lead users. Elaborating the results from this sort of research to include the time element: in what stage of the products' life span the development happens, could be useful.

Regarding the involvement and motivation of lead users, an empirical research about the applicability of the suggestions for a successful lead-user involvement project in section 5.1.2 would be very interesting. Since a number of those suggestions are only based on the empirical findings of this study, it would be useful to e.g. survey users after they have been involved in the stated ways and ask for feedback and suggestions to make the process better.

6 Conclusion

Firms today are acting in increasingly competitive environments, trying to beat their competitors to better serve the needs of customers. Whereas information about what users want right now is rather easy to gather via satisfaction surveys or focus groups, figuring out their future needs and thereby beating competition is what can bring companies a leading position in the market.

Lead users can be a way for companies to get access to information about customers' future needs. By identifying lead users that face needs that will become general in the marketplace, and are unsatisfied with current offerings, companies can gain better insights about which direction to develop their services and products in the future. This study has contemplated the current identification methods to find rare lead users, and tested the appropriateness of the Mountaineering method in the context of social innovations. In particular, the research was conducted in order to find lead users in the field of flexible and collaborative work.

Previous lead-user identification methods have been considered burdensome and time-consuming, but the Mountaineering process could be completed within a relatively short period of four months with the contribution of only one researcher. Compared to other more studied identification methods, Mountaineering enables the researcher to take advantage of multiple starting points and a larger gear set of available methods. This study also provided proof that lead users can successfully be identified also within less technological contexts than the ones studied previously.

The users interviewed in this study shared a vision towards more flexible working arrangements, fueled by an increasing number of knowledge workers and people who choose to work as freelancers and entrepreneurs rather than work for bigger companies. While this could mean that more work is done outside of the office, people in general feel more productive when they are surrounded by others, which creates an increasing demand for co-working spaces. In bigger corporations, the role of the corporate real estate management unit was seen as one broadening towards collaboration with other support functions: ones of human resources and information technology, without which flexible and collaborative work cannot be done effectively. Lead users in this context had tackled the problem of e.g. measurability of flexible work by developing own mechanisms for measuring the productivity of work instead of time spent at work.

The study also aimed at getting insights as to how to best involve and motivate lead users to participate in the product development process of both consulting services

and software development in the field of flexible and collaborative work. A number of recommendations in order to create a successful involvement project were given. These included selecting the most collaborative lead users if there were many to choose from, forming a committed, cross-functional team, organizing a workshop where users are engaged in both discussion about future trends and some physical activity such as paper prototyping, planning a continuous feedback loop in order to learn from each encounter, and finally, letting networks outside the company know about the improvements and efforts made for creating better offerings in the future.

Companies are aiming at better understanding their users' needs and desires, and are surveying customers and studying competitors to learn more about their marketplace. This study suggests that identifying lead users to be involved in the product and service development efforts of companies can help them in creating a competitive advantage in terms of access to better quality information about future needs of customers in the marketplace. Identifying the correct users to be involved can be done effectively with the Mountaineering method evaluated in this study. To conclude, a message to managers from this study is that if one is going to listen to users, one might as well listen to the insightful ones.

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Appendices

Appendix 1: Lead userness self-assessment questions in English

1.1 Best practices and solutions that support flexible and collaborative work

Lead-user characteristic	Question
Ahead of a Trend	*I have improved or created practices or solutions that support flexible and collaborative work*
Technical Expertise	*I can develop practices or make technical changes to solutions that support flexible and collaborative work*
High Benefit Expected	*I have already had problems with flexible and collaborative work that could not be solved with conventional offerings available on the market*
Community-Based Resources	*I know many other people who have improved or created practices or solutions that support flexible and collaborative work*

1.2 Measuring or analyzing flexible and collaborative work

Lead-user characteristic	Question
Ahead of a Trend	*I have improved or created solutions that help measure or analyze flexible and collaborative work*
Technical Expertise	*I can make technical changes to solutions that help measure or analyze flexible and collaborative work*
High Benefit Expected	*I have had problems with measuring or analyzing flexible and collaborative work that could not be solved with conventional offerings available on the market*
Community-Based Resources	*I know many other people who have improved or created solutions that help measure or analyze flexible and collaborative work*

1.3 Planning and design of physical spaces for facilitating flexible and collaborative work

Lead-user characteristic	Question
Ahead of a Trend	*I have improved or created physical work places that support flexible and collaborative work*
Technical Expertise	*I can make changes to physical work places that support flexible and collaborative work*
High Benefit Expected	*I have already had problems with physical work places that support flexible and collaborative work that could not be solved with conventional offerings available on the market*
Community-Based Resources	*I know many other people who have improved or created physical work places that support flexible and collaborative work*

1.4 Utilizing and managing physical spaces for flexible and collaborative work

Lead-user characteristic	Question
Ahead of a Trend	*I have improved or created solutions that support utilizing or managing physical spaces for flexible and collaborative work*
Technical Expertise	*I can make technical changes to solutions that support utilizing or managing physical spaces for flexible and collaborative work*
High Benefit Expected	*I have already had problems with solutions that support utilizing or managing physical spaces for flexible and collaborative work that could not be solved with conventional offerings available on the market*
Community-Based Resources	*I know many other people who have improved or created solutions that support utilizing or managing of physical spaces for flexible and collaborative work*

Appendix 2: Lead userness self-assessment questions in Finnish

2.1 Parhaat käytännöt ja ratkaisut, jotka tukevat joustavaa ja yhteistoiminnallista työtä

Edelläkäyttäjän ominaisuus	Kysymys
Edellä trendiä	*Olen parannellut tai keksinyt käytäntöjä tai ratkaisuja, jotka tukevat joustavaa ja yhteistoiminnallista työtä*
Tekninen kyvykkyys	*Osaan kehittää käytäntöjä tai tehdä teknisiä muutoksia ratkaisuihin, jotka tukevat joustavaa ja yhteistoiminnallista työtä*
Korkea odotettu hyöty	*Markkinoilla tarjolla olevat tuotteet ja palvelut eivät ole pystyneet ratkaisemaan niitä ongelmia, joita minulla on ollut liittyen joustavaan ja yhteistoiminnalliseen työhön*
Yhteisön resurssit	*Tunnen paljon muita ihmisiä, jotka ovat parannelleet tai keksineet käytäntöjä tai ratkaisuja, jotka tukevat joustavaa ja yhteistoiminnallista työtä*

2.2 Joustavan ja yhteistoiminnallisen työn mittaaminen ja analysointi

Edelläkäyttäjän ominaisuus	Kysymys
Edellä trendiä	*Olen parannellut tai keksinyt ratkaisuja, jotka auttavat mittaamaan tai analysoimaan joustavaa ja yhteistoiminnallista työtä*
Tekninen kyvykkyys	*Osaan tehdä teknisiä muutoksia ratkaisuihin, jotka auttavat mittaamaan tai analysoimaan joustavaa ja yhteistoiminnallista työtä*
Korkea odotettu hyöty	*Markkinoilla tarjolla olevat tuotteet ja palvelut eivät ole pystyneet ratkaisemaan niitä ongelmia, joita minulla on ollut liittyen joustavan ja yhteistoiminnallisen työn mittaamiseen tai analysointiin*
Yhteisön resurssit	*Tunnen paljon muita ihmisiä, jotka ovat parannelleet tai keksineet ratkaisuja, jotka auttavat mittaamaan ja analysoimaan joustavaa ja yhteistoiminnallista työtä*

2.3 Joustavaa ja yhteistoiminnallista työtä tukevien tilojen suunnittelu

Edelläkäyttäjän ominaisuus	Kysymys
Edellä trendiä	*Olen parannellut tai luonut fyysisiä tiloja, jotka tukevat joustavaa ja yhteistoiminnallista työtä*
Tekninen kyvykkyys	*Osaan tehdä fyysisiin tiloihin muutoksia, jotka tukevat joustavaa ja yhteistoiminnallista työtä*
Korkea odotettu hyöty	*Markkinoilla tarjolla olevat tuotteet tai palvelut eivät ole pystyneet ratkaisemaan niitä ongelmia, joita minulla on ollut joustavaa ja yhteistoiminnallista työtä tukevien fyysisten tilojen käytössä*
Yhteisön resurssit	*Tunnen paljon muita ihmisiä, jotka ovat parannelleet tai luoneet fyysisiä tiloja, jotka tukevat joustavaa ja yhteistoiminnallista työtä*

2.4 Joustavaa ja yhteistoiminnallista työtä tukevien tilojen hyödyntäminen ja hallinnointi

Edelläkäyttäjän ominaisuus	Kysymys
Edellä trendiä	*Olen parannellut tai keksinyt ratkaisuja hyödyntääkseni tai hallinnoidakseni fyysisiä tiloja, joita käytetään joustavassa ja yhteistoiminnallisessa työssä*
Tekninen kyvykkyys	*Osaan tehdä teknisiä muutoksia ratkaisuihin, jotka auttavat hyödyntämään tai hallinnoimaan fyysisiä tiloja, joita käytetään joustavaan ja yhteistoiminnalliseen työhön*
Korkea odotettu hyöty	*Markkinoilla tarjolla olevat tuotteet tai palvelut ole pystyneet ratkaisemaan niitä ongelmia, joita minulla on ollut hyödyntääkseni tai hallinnoidakseni fyysisiä tiloja, joita käytetään joustavaan ja yhteistoiminnalliseen työhön.*
Yhteisön resurssit	*Tunnen paljon ihmisiä, jotka ovat parannelleet tai keksineet ratkaisuja hyödyntääkseen tai hallinnoidakseen fyysisiä tiloja, joita käytetään joustavassa ja yhteistoiminnallisessa työssä*

Appendix 3: Detailed answers to lead userness self-assessments

This appendix lists the user-specific scores for all 22 interviewed users. Q1 is the first trend, Q2 the second etc. Q1.1 is the first of four self-assessment questions (*Ahead of a Trend*), Q1.2 the second one of *Technical Expertise* etc.

User	Date	Time	Q1 Total	Q1.1	Q1.2	Q1.3	Q1.4	Q2 Total	Q2.1	Q2.2	Q2.3	Q2.4
1	28.6.2013	12:30	23	7	7	2	7	21	6	5	7	3
2	2.7.2013	9:00	24	7	7	5	5	19	5	4	6	4
3	5.7.2013	10:00	26	7	7	5	7	13	2	2	6	3
4	5.7.2013	13:00	19	6	5	1	7	25	6	5	7	7
5	8.7.2013	9:30	22	6	4	6	6	15	3	3	7	2
6	8.7.2013	11:30	20	5	5	3	7	17	6	1	6	4
7	11.7.2013	9:30	22	6	6	3	7	25	6	7	7	5
8	11.7.2013	17:00	28	7	7	7	7	22	6	6	7	3
9	15.7.2013	12:30	27	7	6	7	7	20	6	5	6	3
10	30.7.2013	10:00	21	7	6	1	7	13	1	2	3	7
11	30.7.2013	12:15	28	7	7	7	7	20	7	3	7	3
12	7.8.2013	18:00	28	7	7	7	7	28	7	7	7	7
13	12.8.2013	21:00	28	7	7	7	7	28	7	7	7	7
14	13.8.2013	13:00	28	7	7	7	7	28	7	7	7	7
15	14.8.2013	9:30	16	5	5	2	4	15	2	5	7	1
16	20.8.2013	10:00	26	7	7	6	6	23	7	7	7	2
17	21.8.2013	9:00	22	7	6	2	7	24	4	6	7	7
18	22.8.2013	14:15	16	5	5	1	5	11	3	3	2	3
19	27.8.2013	11:00	24	7	5	5	7	9	1	1	6	1
20	29.8.2013	14:00	25	6	7	6	6	19	6	3	5	5
21	29.8.2013	17:00	21	6	6	3	6	23	7	7	7	2
22	5.9.2013	16:00	18	7	4	1	6	19	5	6	2	6

User	Q3 Total	Q3.1	Q3.2	Q3.3	Q3.4	Q4 Total	Q4.1	Q4.2	Q4.3	Q4.4	User category	Overall score
1	22	7	7	2	6	17	6	5	3	3	Consultants	83
2	20	7	7	1	5	21	5	6	6	4	FM & WM & CREM	84
3	23	7	5	5	6	21	5	5	6	5	Consultants	83
4	22	7	7	1	7	28	7	7	7	7	Consultants	94
5	19	6	6	3	4	12	1	2	5	4	Consultants	68
6	27	7	7	6	7	16	2	2	7	5	Researchers	80
7	26	7	6	6	7	26	7	6	6	7	Researchers	99
8	26	7	7	7	5	20	6	6	7	1	Co-working space managers	96
9	28	7	7	7	7	25	7	7	6	5	Co-working space managers	100
10	22	7	7	1	7	22	7	7	1	7	FM & WM & CREM	78
11	28	7	7	7	7	15	7	3	3	2	Co-working space managers	91
12	22	7	7	1	7	28	7	7	7	7	Researchers	106
13	28	7	7	7	7	28	7	7	7	7	Co-working space managers	112
14	28	7	7	7	7	28	7	7	7	7	Consultants	112
15	15	2	4	4	5	15	5	1	4	5	Researchers	61
16	19	7	7	1	4	23	7	7	7	2	FM & WM & CREM	91
17	22	7	7	1	7	23	5	6	5	7	FM & WM & CREM	91
18	22	7	7	1	7	12	7	2	1	2	FM & WM & CREM	61
19	22	7	5	5	5	17	7	5		5	HR Professionals	72
20	20	6	6	3	5	12	3	2	2	5	Researchers	76
21	24	7	7	4	6	24	5	7	6	6	FM & WM & CREM	92
22	20	7	5	2	6	19	7	4	2	6	FM & WM & CREM	76